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COST AND DESIGN OF HOUSING
FOR DISABLED PERSONS
CASE STUDIES

FINAL REPORT

Canada Mortgage and Housing Corporation, the Federal Government's housing agency, is responsible for administering the National Housing Act.

This legislation is designed to aid in the improvement of housing and living conditions in Canada. As a result, the Corporation has interests in all aspects of housing and urban growth and development.

Under Part V of this Act, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research. CMHC therefore has a statutory responsibility to make widely available, information which may be useful in the improvement of housing and living conditions.

This publication is one of the many items of information published by CMHC with the assistance of federal funds.

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COST AND DESIGN OF HOUSING FOR DISABLED PERSONS
CASE STUDIES

FINAL REPORT

Prepared for
Canada Mortgage and Housing Corporation
by
Associated Planning Consultants

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ABSTRACT

A.W. Cluff and P.J. Cluff Architects/Associated Planning Consultants Inc. were commissioned by Canada Mortgage and Housing Corporation (CMHC) to carry out a research project entitled Cost and Design of Housing for Disabled Persons: Case Studies.

Through the analysis of case studies, specific information was produced on design and cost aspects of housing elements relating to accessibility for disabled persons and suited to a variety of housing contexts.

Seventeen case studies were selected across Canada to provide a cross-section of case studies by region, type of accommodation, method of financing, conversions versus purpose-built, and disability type. Data collection was primarily through field visits using a data collection checklist as a guide. Interviews were carried out with users, architects, contractors, housing authorities, CMHC representatives and others as required to obtain the necessary information. House/floor/ unit plans were obtained and photographs taken where appropriate.

Data were analyzed to determine the functional status of the user and the appropriateness, functional adequacy and acceptability of the disability-related design features within the housing. Where available, information was collected on the cost of incorporating these features into the housing. In addition, cost estimates were prepared by cost consultants for each case study and presented in mid-1982 dollars.

The report contains information on the methodology of the research study, the general findings, narrative reports on each of the case studies, including cost data, and appendices on the data collection material, list of contacts, funding programs, and cost update and geographical indices.

The case studies provide a general overview of disability-related design features, costs, funding and contracting methods. This small sampling indicates a broad range of variables and suggests the need for further research and information regarding disability-related design and costs for a variety of housing contexts in Canada.

This project was funded by Canada Mortgage and Housing Corporation, but the views expressed are the personal views of the author(s) and no responsibility for them should be attributed to the Corporation.

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PREFACE

As part of its ongoing research into the housing needs of disabled persons, Canada Mortgage and Housing Corporation commissioned A.W. Cluff and P.J. Cluff Architects and Associated Planning Consultants Inc. to undertake this study.

The objective of the study was to produce, primarily through the analysis of case studies, specific information on design and cost aspects of accessibility-related features in a variety of housing contexts that can be provided reasonably within the limits of existing programs and funding.

It is hoped that the information in this study will be used for future reports, data sheets and construction costs concerning the needs of disabled persons, and in the promotion of accurate information about accessible housing alternatives, based on the documentation of pertinent experience.

It may also assist in ensuring that existing programs and mechanisms are used and interpreted more systematically across Canada so that a more equable distribution of appropriate shelter alternatives is available to disabled persons.

ACKNOWLEDGMENTS

The consultants would like to thank the national and regional staff members of Canada Mortgage and Housing Corporation, and the provincial and municipal housing authorities, service agencies, architects, designers and others who participated in this study.

We would particularly like to thank the users who volunteered to participate in the interviews; to them we extend our special appreciation.

A.W. Cluff
Associated Planning Consultants
Project Director

METHODOLOGY

RESEARCH DESIGN

The study, of approximately eight-months duration, was divided into four phases:

1. Research Design
2. Data Collection
3. Data Analysis
4. Production of the Report

In addition, thirteen tasks associated with these phases were identified:

Orientation
Refinement of Methodology
Development of Tools
Field Trips
Basic Analysis
Cost Analysis
Design Analysis
Delivery Analysis
Cost Information
Design Information
Delivery Information
Report Preparation
Report Delivery

CASE STUDY SELECTION

The information was produced primarily through the analysis of case studies. Criteria for case study selection were determined to provide a cross-section of projects by region, module (type of project), type of accommodation and the nature of the disability of the users. These are listed in detail below.

Region

One city was chosen within each region for selection of case studies; cities are indicated in brackets.

Atlantic Region (Halifax)
Quebec Region (Montreal)
Central Region (Toronto)
Prairie Region (Winnipeg)
West Coast Region (Vancouver)

Modules

Module 1: Conversion - RRAP Funding
Module 2: Conversion - Other Funding
Module 3: Purpose-built - Upgrading Recommended
Module 4: Purpose-built

Type of Accommodation

Private Homes
Group Homes
Apartments/Residences

Nature of the Disability of the User

Non-ambulatory
Semi-ambulatory
Coordination Disabled
Sensory Disabled
Mentally Impaired

Preliminary information was collected on approximately seventy-five case studies and a discussion paper on case study selection was prepared outlining the preliminary information. Based on this information, approximately twenty-five case studies were selected for further consideration. A list of fifteen was recommended and approved for data collection by field visits and potential inclusion in the final report. During field visits, two case studies were added; this report, therefore, provides an analysis of seventeen case studies.

DATA COLLECTION

A single data collection sheet was formulated to collect preliminary information on the seventy-five case studies. Following this, a twenty-page data collection checklist was developed by the consultants and revised according to comments received from the consultant team and CMHC representatives. (See Appendix 1 for copies of these checklists.) After the list was approved by CMHC for use during field visits, it was tested on Central Region (Toronto) case studies, and minor revisions were made. The remainder of the field visits were then scheduled and carried out by members of the consultant team. The schedule is listed below.

Region	City	Week of: (1982)
Central	Toronto	April 5-9, 12-16
Atlantic	Halifax	April 19-23
West Coast	Vancouver	May 10-14
Quebec	Montreal	May 17-21
Prairie	Winnipeg	May 31-June 4

Visits were made to all users in the case studies and, for each case study, the user was interviewed. Each user signed a consent form (see Appendix 2). In addition, the consultants met with architects, contractors, owners, managers, housing authorities or corporations, and CMHC representatives. The purpose of the interviews was to obtain the following information:

specific and detailed descriptions of all accessibility-related aspects of the housing/dwelling, and how these relate to the functioning of the disabled occupants;

information on the cost of incorporating these design features into the housing/dwelling;

information on the acceptability of the accessibility-related aspects of the housing/dwelling.

Chart 1 provides a list of the seventeen case studies and some characteristics of each.

Floor, house, and/or unit plans were obtained or sketched for each project and, where appropriate, photographs were taken.

The data was compiled, summarized and presented to CMHC on 18 June 1982 and a summary progress report presented to all members of the Committee. Approval to proceed to Data Analysis (Phase 3) was given.

DATA ANALYSIS AND PREPARATION OF REPORT

Data analysis was carried out by the consultant team throughout the Data Collection, Data Analysis and Production of the Report phases. It was decided that the case studies would be presented under the following headings:

Description of User
Description of Housing
Method of Financing
Disability-related Features
    Exterior
    Interior Public Areas
    Dwelling Unit
Functional Adequacy/Cost Effectiveness
Codes/Standards/Requirements/Guidelines
Administration/Construction
Comments
    Existing Information on Costs
    Cost Estimates
    - Exterior
    - Interior Public Areas
    - Dwelling Unit
Floor Plans
Photographs

The information compiled has been summarized under the above headings in the following way.

Description of User

General information on the age, sex, household composition, disability (type and onset), functional status, assistance requirements, employment status, income range and cost of accommodation are reported in this section.

Description of Housing

The type of housing and the housing context are described in this section, and the date of completion of the building or renovations is given.

Method of Financing

This section deals with the method and source of financing of the construction or renovations of the housing in question. See Appendix 4 for a description of public and third sector financing available in the provinces in which the case studies are located for the conversion and improvement of existing housing into fully accessible units.

Disability-Related Features

This section describes the features of the housing that relate to the disabled occupant or user. It should be noted that the selection of these items involves judgment and may be questioned. For example, such items as covered parking and automatic doors, although particularly beneficial to disabled persons, are also beneficial for non-disabled persons and are, therefore, not necessarily disability-related. Where such items have been included and costed, these have been noted in the case study.

Where applicable, a description of any non-disability-related renovations has been included: for example, general repairs, and renovations to meet code requirements.

The disability-related items are grouped into three areas. The first, Exterior, includes such items as exterior ramps, parking, sidewalks and driveways. The second, Interior Public Areas, is applicable to apartment buildings, where space is used by more than one unit. Such items as main entrances, elevators and corridors are included here. The third area, the Dwelling Unit, includes details of the user's apartment, private home, or group home.

Functional Adequacy/Cost Effectiveness

General comments regarding the functional adequacy of the solution provided are discussed in this section. Both the user's opinion and the consultant's judgment have been considered in making these comments. General comments on the reasonableness of the solution with respect to cost are also included where appropriate.

Codes/Standards/Requirements/Guidelines

General comments are made in this section on whether the disability-related features meet generally accepted codes, standards, requirements or guidelines. It should be noted, however, that lack of compliance does not necessarily detract from the solutions provided in each case study. In fact, most of the users are satisfied with their environment despite design problems that they or the consultants noted. It is suggested that not only generally accepted design criteria must be considered, but the individual user's requirements and assessment of the environment, as well as such practical aspects as availability of funding and other construction limitations.

Comments

General comments on each case study have been made which relate to factors requiring special consideration.

Existing Information on Costs

Cost information was collected, when available, during the data-gathering phase of this study. In many cases, the information was non-existent, incomplete or provided insufficient detail. Additional variables were also introduced because of dates of construction, geographical location, method of contracting and standard of work.

A summary of information available has been included in each case study but caution is advised in its use for comparison or other purposes.

Cost Estimates

The cost consultants prepared cost estimates of the disability-related features of each case study. These are reported in mid-1982 dollars for the city in which the case study is located. In addition, cost estimates are reported for proposed upgrading for Module 3 case studies, and for general repairs in Modules 1 and 2, where applicable. The data is organized into exterior, interior public areas and dwelling unit disability features. These estimates provide standardized cost data for each region. Reference should also be made to the cost comparisons and geographical indices contained in Appendix 5.

Floor Plans and Photographs

Floor plans showing existing layouts are provided in each case study; proposed upgrading is also shown, where applicable. Photographs are used to illustrate disability-related features.

CHART 1 CHARACTERISTICS OF SEVENTEEN CASE STUDIES

Case	Module	Type of Accommodation	Funding
CENTRAL			
1	3	Apartment - 14-storey (purpose-built)	CMHC and OHC
2	2	Private Home - 2-storey (conversion)	Private
3	3	Apartment - 6-storey (purpose-built)	CMHC and OHC
ATLANTIC			
4	2	Private Home - single-storey (conversion)	Provincial Grant and Private
5	2	Private Home - single-storey (conversion)	Provincial Grant and Private
6	1	Private Home - 2-storey (conversion)	Provincial Grant RRAP and Private
7	1	Group Home - 3-storey (conversion)	CMHC and RRAP
WEST COAST			
8	1	Group Home - single-storey (conversion)	RRAP and CMHC
9	4	Apartment/Transitional Residence - 3-storey (purpose-built)	CMHC
10	1	Group Home - single-storey (conversion)	RRAP and CMHC
QUEBEC			
11	2	Apartment - 12-storey (conversion)	Provincial Grant and Private
12	1	Row Housing - 2-storey (conversion)	CMHC
13	3	Private Home - 4 plex, 2-storey (purpose-built)	CMHC
PRAIRIES			
14	2	Private Home - single-storey (purpose-built)	Private
15	4	Apartment/Transitional Residence - 6-storey (purpose-built)	CMHC and MHRC
16	1	Private Home - split level (conversion)	RRAP
17	4	Apartment, Transitional Residence - 3-storey (purpose-built)	CMHC and MHRC

INTRODUCTION TO THE CASE STUDIES

The case study sampling in this project is rather small and represents, in many instances, the "success stories." The volunteer users who took part in the study were, for the most part, disabled people who have learned to manage their environment. The sample is not, therefore, necessarily indicative of the general disabled population.

In purpose-built accommodation, particularly apartments, the provision of standardized solutions for modifying the environment for the disabled is not always appropriate for every individual. Some may require further modification tailored to their specific needs.

The following definitions may be used referring to housing or dwelling units*.

Accessible Unit: a unit that can be entered by a person using a wheelchair, crutches or other mobility aid.

Mobility Unit: a unit in which space is provided for manoeuvring a wheelchair but in which there are no special fitments.

Wheelchair Unit: a unit in which all areas and all fitments are especially designed for a wheelchair user.

Especially Designed Unit: a unit in which all fitments are especially designed for independent use and are free of architectural barriers.

The case studies indicate that even where units are "especially designed", there is frequently a requirement for further adaption to meet individual user requirements.

The use of federal, provincial and other funding was reviewed in each case study and provided some useful general conclusions.

The volume of use of CMHC's Residential Rehabilitation Assistance Program (RRAP), under which funds are available for renovation for the disabled, varies considerably across the country. Statistical data on the use of RRAP funding are sparse, as reporting mechanisms vary from region to region. In some instances, particularly when general repairs are undertaken jointly with disability-related features, the records may not indicate the separate uses of the funding.

No particular difficulties were indicated by any users regarding the application, processing or receipt of RRAP funding, but the volume of applications varies from region to region. Applications to the fund seem to depend on how well-known or well-publicized the program is within an area and how active community agencies are in representing and presenting users' applications.

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* Canada Mortgage and Housing Corporation, Housing Disabled Persons, Ottawa 1982.

Further detailed study may be required to indicate what changes, if any, should be made to ensure an equable distribution of funding under this program for the disabled.

The availability of funds from provincial and other sources, varies considerably, and, in some cases, combinations of funding have been used. In most cases, this funding amounts to only a very small sum and is not accompanied by any requirements regarding standards or guidelines. Nevertheless, these relatively low-cost funding programs allow individual disabled people to provide themselves with comparatively inexpensive disability-related features - wheelchair showers and ramps, for instance - and they should be encouraged.

The use of the Non-Profit Housing Program for new construction (financed under the National Housing Act, Section 56-1) requires that units meet certain requirements. In some instances, however, these requirements do not help, but rather hinder, the disabled. For example, a height of 1 070 mm is required by building regulations for balcony enclosures for safety purposes. If a balcony is of solid construction, compliance with these standards means that the enclosure will be too high for a person sitting in a wheelchair to see over. Improved design solutions that allow the requirements to be met without providing further barriers to the disabled will be developed as knowledge of needs of the disabled persons grows.

The case studies include a wide range of housing contexts and a large range of work done to effect improved accessibility. The work, in some cases, did not follow existing codes, standards, requirements or guidelines and tended to be determined by individual user requirements and, more frequently, by the funds available. There are a number of readily available codes, standards and guidelines for designing for the disabled, and it is suggested that greater use be made of these documents when considering the design or modification of existing facilities for the disabled.

User attitude also varied considerably and many of the disabled demonstrate great patience and a willingness to adapt to conditions that would be unacceptable to others. In some instances, further expenditures on disability-related features are unwarranted because user abilities or user attitudes are the limiting factor, not the physical barriers. For example, a physically accessible kitchen will not be used by a user who does not intend to cook and additional bathroom grab bars will not assist a quadraplegic with reduced upper body strength and mobility who cannot transfer independently.

The field visits reinforced earlier concerns regarding the safety and comfort of disabled persons and others as a result of the incorporation of disability-related features. In particular, vertical hoists have been installed in some cases, many without adequate safety features or inspection procedures. Although it is recognized that the cost of vertical hoists that meet all code requirements may be prohibitive, it is strongly felt that minimum safety features must be included in all cases. These include protective safety gate interlocks, enclosed shafts, a method of securing the wheelchair during transit and the provision of a pit or other means to reduce the risk of children or others being injured below the platform at the lower level. Consideration is currently being given in some areas to the provision of special residential hoist code requirements that will provide adequate safety at reduced cost and this is to be commended.

In the case studies, the costs of the actual installation of vertical hoists have been estimated; when installation does not appear to meet code requirements, this fact is noted. For example, there is also a need to consider other special devices to assist disabled persons to have increased control of their environment. Hardware for windows and sliding doors poses particular problems for disabled persons, who are frequently unable to operate these without assistance. There is an urgent need to improve the design of this hardware for general use as well as for the use of disabled persons. There is also a need to consider other special devices to assist disabled persons to have increased control of their environment.

It is the purpose of this study to add to the knowledge and encourage a sharing of information about the needs of the disabled, based on their own experiences. It is hoped that the report will be used as a basis for future reports, data sheets and construction cost studies and assist in the promotion of accurate information that would be of assistance in answering requests for advice on accessible housing alternatives based on the documentation of real experiences. Interviews across Canada indicated a continuing need to provide additional technical assistance through CMHC offices, provincial housing authorities, and service agencies to users in the form of data, typical details and appropriate cost estimates for a range of disability-related features for a diversity of alternatives for housing disabled people in Canada.

This report should encourage consideration of the systematic use and interpretation of existing programs and mechanisms across Canada to ensure an equable distribution of appropriate shelter alternatives for disabled persons.

Finally, the case studies themselves serve as models to others and indicate what can be achieved by individuals, through a mixture of determination and ingenuity, to secure better housing for disabled people.

CASE STUDIES
CENTRAL REGION
(Toronto, Ontario)

CASE STUDY 1
Apartment
Module 3: Purpose-built - Upgrading Recommended

CASE STUDY 2
Private Home
Module 2: Conversion

CASE STUDY 3
Apartment
Module 3: Purpose-built - Upgrading Recommended

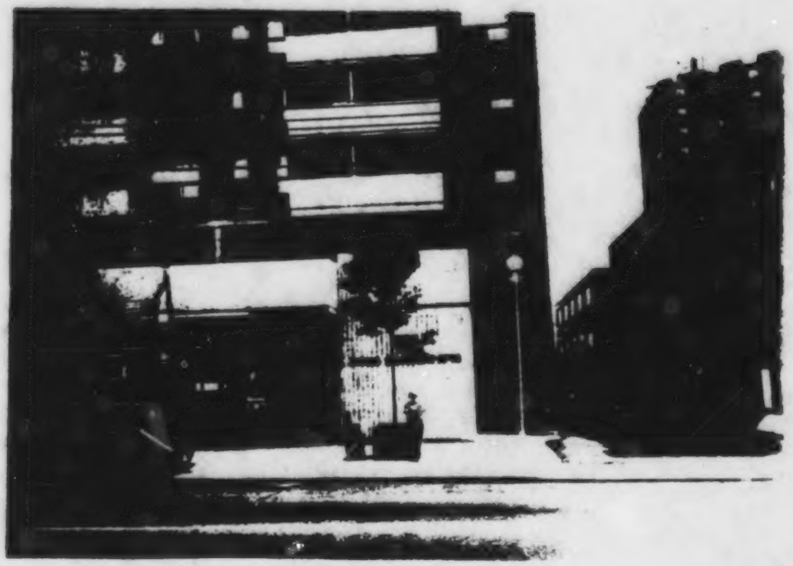
CASE STUDY 1

1

REGION: Central

PROJECT: Apartment (14-storey)
Toronto, Ontario

MODULE 3: Purpose-built - Upgrading Recommended



DESCRIPTION OF USER

The user is a man in his early forties who has been confined to a wheelchair since 1975 as the result of an injury. He is classified as a C-6, C-7 quadriplegic with partial paralysis affecting all parts of the body below the level of the upper arm. He transfers independently except to the bath/shower seat, which he finds too difficult and hazardous. He receives six hours a week of nursing and personal care and eight hours a week of homemaking assistance. He receives family benefits of about $364 a month, of which he pays about 25 per cent to rent the one-bedroom apartment in which he has lived alone for the last six months.

DESCRIPTION OF HOUSING

This residence is a purpose-built unit for the disabled in a 14-storey 300-unit apartment building which was completed in 1981. It was designed to include 14 wheelchair-adapted units throughout the building with provisions made to supply attendant care to disabled occupants as required.

METHOD OF FINANCING

The building was financed under the National Housing Act, Section 56.1 and was constructed by Metropolitan Toronto Non-Profit Housing.

DISABILITY-RELATED FEATURES

Exterior

Outdoor parking for the disabled is provided; there is also a covered drop-off area at the front entrance and an enclosed sloped passageway to the main entrance.

Interior Public Areas

Standard

Dwelling Unit (see photographs)

The international wheelchair symbol is displayed on the doors of the adapted units. The apartment has raised electrical duplex outlets, lever door handles throughout, metal corner guards and two peepholes (low and high) in the front door. The front closet has a folding door and a low rod and shelf; the storage cupboard has low shelving and is large enough to permit wheelchair use. The door sill has a bevelled edge to the balcony and the tenant has had a ramped platform built on the balcony so that he can see above the balcony front enclosure.

The kitchen has a stove with front controls and a sink with knee clearance, lever handles, and insulated pipes. The counter has knee clearance under part of it and enlarged toe space. Open shelving is provided under the counter and low open shelves above (no closed upper cupboards). A pantry between the kitchen and the living/dining area provides storage. The bathroom has a washbasin with knee clearance, lever handles, and insulated pipes. The bath/shower has grab bars, a telephone hand shower and a shower seat. There is a booster on the toilet.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

A number of problems were noted by the user and consultants. The sloped tunnel entrance to the main door is very windy, the doors are too heavy and the door handles and elevator buttons are too high.

General circulation and approach to doors within the apartment is poor, especially in the front entrance area, the entrances to the bathroom and bedroom, and the linen closet area. The balcony door is narrow and poorly insulated (draughty), and the guard rail is too high to see over. The bathroom arrangement is poor. The toilet is too close to the bathub, the grab bars are inappropriate, and the dial tap for the shower is hard for the user to operate. The washbasin gets in the way of his knees, the lever handles are too short to reach, and he cannot reach the glass/toothbrush holder and soap dish. No major problems were noted in the kitchen and only minor changes are recommended.

The additional amount spent during construction to provide this disabled unit was relatively small. Had the design been more appropriate, this case study would have represented a cost effective solution. A sufficient number of problems were noted, however, to warrant designating this case Module 3 - Purpose-Built - Upgrading Recommended.

Upgrading Recommended (see floor plans)

Provide a door opening assistance device and low lever door handles at the main entrance to the apartment building.

Lower the elevator call and cab buttons.

Relocate the toilet to improve access to the bath; relocate the mirror, the electrical duplex outlet and accessories; replace the faucet to the bath with lever handles.

Remove the present storage area and relocate the closets to provide additional circulation space; relocate the entrance door to improve accessibility.

Relocate the linen shelves to improve accessibility.

Provide a ramp and raised platform to the balcony to improve visibility. (During the course of the consultant's investigation, the user had a ramp added. It should be noted that the height of the balcony enclosure now contravenes building regulations requirements.)

Make minor changes to the kitchen (relocation of sink or extension of the counter) to improve accessibility.

Owing to the design of the building, part of the living area and bedroom overhangs an open space and thus the floor area is cold in winter. Both the user and the attendant who provides daily care are concerned about this cold area and consideration may be given to carpeting or otherwise insulating the floor area. Because this item is not specifically associated to disability, it has not been included in the suggested upgrading.

CODE/STANDARDS/REQUIREMENTS/GUIDELINES

Many of the available standards have not been followed in the design of the unit in this case study; this has resulted in the problems noted above.

ADMINISTRATION/CONSTRUCTION

The building was architect-designed and construction was carried out by a general contractor for a fixed-sum contract.

COMMENTS

The unit in this case study shows that even in recent purpose-built construction, the design can create considerable problems for the disabled occupant. Some of the problems in this case relate to limited space and some to the planning of existing space. Good design guidelines for apartments are available and can be used to improve an existing design at little or no additional expense.

Existing Information on Costs

The construction costs were reported as $25,000 a unit (300 units) and the land costs as $4,000 a unit for a total of $29,000. This has been estimated by the cost consultants as the equivalent of $37,000 in mid-1982 dollars. The contractor had no figures on the additional cost of adapted units, but thought it was considerably less than $5,000 a unit and considerably less than a CMHC estimate of 12 per cent for increased costs of units designed for the disabled.

Cost Estimates (tables 1 and 2)

Cost estimates have been prepared based upon available information, drawings, photographs and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs per unit	
Disability-related features	$3 120
Upgrading recommended	$3 910
Upgrading costs had the recommended features been incorporated at the time of construction	$1 100

See tables 1 and 2 for detailed cost estimates.

Table 1 Estimated Costs (mid-1982 dollars) of Disability-Related Features Built During Construction

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways[1]	NC	NC	Additional area			Additional area[4]	2 700	
Parking[2]	NC	NC	Circulation			Circulation		
Entrance			General			General	N/A	
Steps	N/A	N/A	Corridors			Hall	N/A	
Ramps[3]	NC	NC	Common			Living	N/A	
Doors	N/A	N/A	areas			Kitchen[5]	55	
Paving	N/A	N/A	Lounges			Bedroom	N/A	
Other			Laundry			Bathroom[6]	120	
Handrails	N/A	N/A	Elevating systems			Service areas		
			Elevators			Utility	N/A	
			Ramps			Storage[7]	NC	
			Stairs			Other areas	N/A	
			Specialties			Specialties		
			Equipment			Equipment	N/A	
			Services			Services[8]	25	
			Systems			Systems	65	
			Other			Other		
			Handrails			Corner		
			Corner			guards[10]	105	
			guards			Balcony sill ramp[11]	50	
							3 120	

Note: The numbered items were considered as potentially contributing to additional costs. Cost estimates are based on special features being incorporated in the original construction.

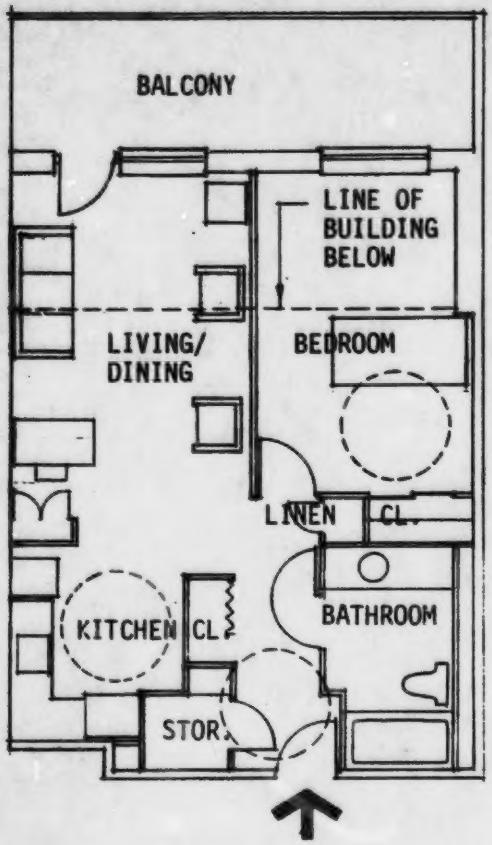
1. Covered drop-off area at front entrance (NC).
2. Outdoor parking for the disabled (NC).
3. Enclosed ramped passageway to main entrance (NC).
4. Apartment exceeds a basic gross area of 48 m^2 by 13 m^2.
5. Includes stove with front controls (NC), knee clearance under sink, lever faucet handles, insulated pipes, open shelving below counter and low open shelving above (NC), toe clearance under counters (NC).
6. Includes knee clearance under washbasin (NC), lever faucets (NC), grab bars at the bath/shower and telephone hand shower (NC).
7. Includes folding door and low rod and shelf in front closet (NC) and low shelving in storage unit (NC).
8. Includes raised electrical outlets.
9. Includes a second main door peephole and lever door handles.
10. Includes seven metal corner guards.
11. Includes a bevelled door sill at the balcony door.

Table 2 Cost Estimates of Recommended Upgrading

Exterior	Per Unit	Total	Interior Public Areas	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/walkways	N/A	N/A	Additional area	N/A	N/A	Additional area	N/A	
Parking	N/A	N/A	Circulation			Circulation		
Entrance			General	N/A	N/A	General	N/A	
Steps	N/A	N/A	Corridors	N/A	N/A	Hall[3]	1 500	
Ramps	N/A	N/A				Living	N/A	
Doors[1]	60	700	Common areas			Kitchen[4]	400	
Paving	N/A	N/A	Lounges	N/A	N/A	Bedroom	N/A	
Other			Laundry	N/A	N/A	Bathroom[5]	1 300	
Hand-rails	N/A	N/A	Elevating systems			Service areas		
			Elevators	N/A	N/A	Utility	N/A	
			Ramps	N/A	N/A	Storage	N/A	
			Stairs	N/A	N/A	Other areas	N/A	
			Specialties			Specialties		
			Equipment	N/A	N/A	Equipment	N/A	
			Services	N/A	N/A	Services	N/A	
			Systems[2]	150	1,800	Systems	N/A	
			Other			Other		
			Handrails	N/A	N/A	Corner guards	N/A	
			Corner guards	N/A	N/A			
						Balcony sill ramp	N/A	
						Balcony elavating ramp[6]	500	
	60			150			3 700	

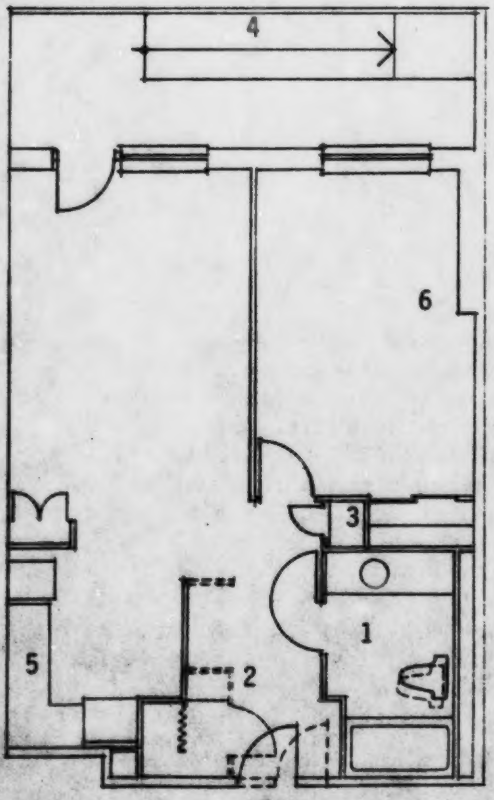
Note: The numbered items show the improvements necessary to upgrade the dwelling unit. Cost estimates are based on the assumption that the work would all be done at the same time and in one apartment only.

1. Includes a door opening assistance device and lowered handles.
2. Includes lowering elevator call and cab buttons throughout the building.
3. Includes removing the storage cupboard and relocating the coat closet, linen shelves and front door.
4. Includes relocating the sink.
5. Includes relocating the toilet, changing the bath faucet to a lever type, relocating grab bars, installing a new shallow washbasin with knee clearance, insulation and lever faucets and lowering the medicine cabinet and glass, toothbrush and soap holders.
6. Includes a fixed wooden ramp being constructed by friends but costed as if done by a paid carpenter.


BALCONY
LINE OF BUILDING BELOW
LIVING/ DINING
BEDROOM
LINEN
CL.
KITCHEN
CL
BATHROOM
STOR.

CASE STUDY NO. 1

EXISTING APARTMENT

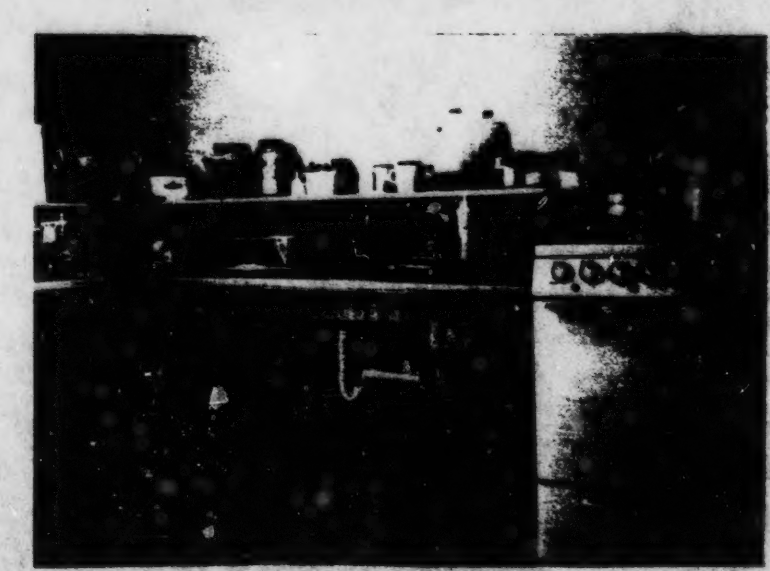


UPGRADING RECOMMENDED

1. Bathroom: relocate toilet, mirror and accessories to provide access; replace dial faucet to bath.
2. Entrance Hall: relocate entrance door, remove storage cupboard and relocate coat closet to improve access.
3. Linen Closet: relocate shelves to provide side access.
4. Balcony: provide ramp with raised landing to permit vision over front of balcony.
5. Kitchen: minor changes to counter and cupboard.
6. Room configuration restricts bed position and circulation - no change possible.

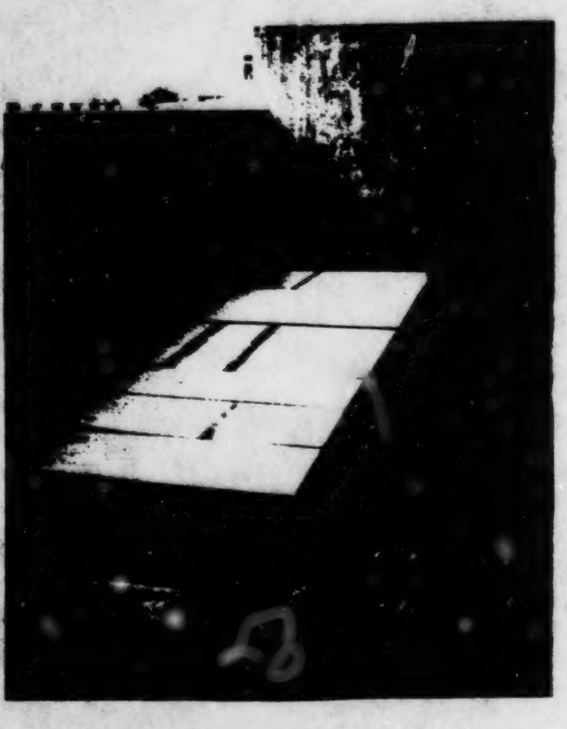
CASE STUDY NO. 1 - PHOTOGRAPHS

Pantry cupboard in living and dining room provides good storage including door mounted shelves.



Insufficient kitchen storage space provided, drop door oven difficult to use; also, electrical outlets to be mounted in front of counter.

CASE STUDY NO. 1 - PHOTOGRAPHS



A ramp has been added to the balcony to permit vision over the balcony front. Note: guard height now does not meet code requirements.

Bathroom with inappropriate placement of toilet and grab bars.

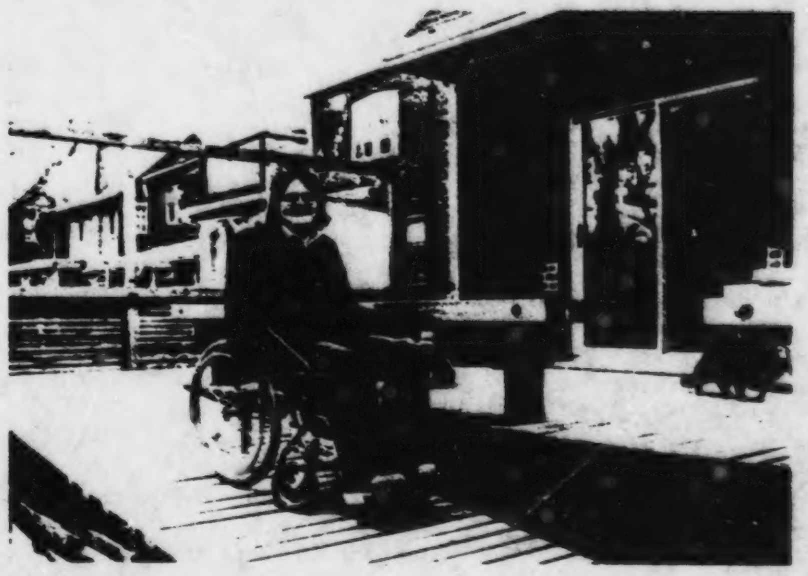
CASE STUDY 2

2

REGION: Central

PROJECT: Private (2-storey)
Toronto, Ontario

MODULE 2: Conversion - Private Funding



DESCRIPTION OF USER

The user is a building designer in his mid-twenties who specializes in designing for disabled persons. He is confined to a wheelchair following an injury sustained in 1973 which left him a T-3 paraplegic. He is independent in all functions of daily living and personal care, and he and his wife, who is also employed, own a home that has been converted to meet their needs. Their joint annual income is in the $30,000 and over range.

DESCRIPTION OF HOUSING

The user's home is an 18 300 x 7 620 mm 2-storey detached brick house on a corner lot, which was purchased in 1976. It was originally a 4-bedroom house.

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*Photographs from Toronto Star, 24 March 1981

There is a rear driveway and garage, and the backyard is large enough to accommodate the added cedar deck and ramp. Most of the renovations were carried out between 1976 and 1978 and some are still in progress.

METHOD OF FINANCING

The purchase and renovating were privately financed. The house is also an income property and the owner estimates that he has received $24 000 over six years from rental income.

DISABILITY-RELATED FEATURES

Exterior (see site plan)

In the backyard, a cedar deck and ramp, brick pavers, an addition to the garage and an electric remote control garage door were added.

Interior Public Areas

Not applicable.

Dwelling Unit (see photographs and floor plans)

A glass double sliding door providing entrance from the cedar deck (flush with floor level) replaced a small window. The ground floor was completely redesigned to allow for a large kitchen, bathroom, a 7 010 x 3 660 mm family/dining room and living room, and a master bedroom. The design is such that there is easy circulation and manoeuvrability for a wheelchair user; a vertical hoist to the basement and upper two levels has been added.

A 4 420 x 2 740 mm kitchen (formerly the dining room) with pine flooring was added. It includes a counter-top stove, stacked built-in oven/dishwasher, adjustable kitchen counters, cupboards, and a sink and eating counter with knee clearance. The user designed a pine cupboard unit of ten roll-out units with large handle pulls which provide 1.4 m^3 of adjustable low storage space.

The 2 740 x 2 130 mm bathrooms is centrally located with double access doors. There is knee clearance under the washbasin, three large roll-out drawers with large handle pulls, lever faucets and a high toilet. The toilet is positioned for side transfer, the counter being used for support. A wheelchair shower was created by tiling the entire bathroom floor with ceramic tile that continues up the wall to a height of 1 070 mm; the floor is contoured in one corner. There is a double shower curtain, lever handles, and a heat/sun lamp in the ceiling.

Other general renovations include new plumbing and wiring, and a new roof, chimney and furnace. The basement was refinished as a studio with a 4-piece bathroom. Skylights were added in the kitchen and bedroom. The second storey used to contain a 1-bedroom and a bachelor apartment; it was converted to a single apartment (minor renovations) to provide a rental income. The staircase and porch were removed and the old living room became the master bedroom.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The user is reasonably satisfied with the current design of the house, and plans to make allowance for a second accessible entrance/exit from the ground floor. The user works in the field of designing for the disabled and, as a result, has been able to design a home that is functional for a person confined to a wheelchair.

Although relatively large expenditures were made by the user, there was much self or free labour and some used materials were obtained (pine flooring, for example). The renovations were carried out over a period of years, and much of the cost is intended to be recovered from rental income. These factors result in a cost-effective solution to provision of housing for this disabled user.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The ramp gradient is steeper than is usually recommended but the user finds it adequate. The vertical hoist does not appear to meet code requirements. The user, however, finds it meets his needs and does not consider it hazardous. The remainder of the dwelling meets or exceeds standards.

ADMINISTRATION/CONSTRUCTION

The owner noted that the choice of house and lot was very important as the corner lot facilitates access to the street and made creation of a new entrance possible. The fact that the house is large enough to be an income property and contain a studio adds to its flexibility and affordability.

The user and his wife, family and friends did much of the work themselves over a period of several years. He admits to having renovated many areas of the house several times to make additional improvements to the design. Some of the work was contracted out.

COMMENTS

This case study represents a unique solution to providing housing for a disabled person in that the user has experience in designing for the disabled and was able to spend a considerable amount of time and money on renovations. He has succeeded in producing an environment that is both aesthetically very pleasing and functionally effective for his particular needs.

Existing Information on Costs

The user estimates the total cost of renovations (mid-1977 dollars) at about $45 000, of which approximately $18 000 relates to general renovations (roof/chimney, studio and four-piece bath, skylights, walls, etc.) and the remainder to disability-related items (kitchen cabinets/counters, storage, appliances, bathroom shower, toilet, cabinets etc., elevator, deck, ramp, sliding door, brick paving).

The user itemized some costs as follows:

- electric garage opener	$ 325
- deck and ramp	$6 600
- sliding door	$1 000
- kitchen cabinets	$2 200
- Corning top	$ 500
- oven	$ 800
- bathroom cabinets/counter	$ 500
- bathroom shower/tile	$1 200
- high toilet	$ 250
- elevator (including shaft)	$6 200
- roof/chimney	$2 000
- electrical/plumbing	$1 200

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of renovations (excluding the basement and second storey): $30 000.

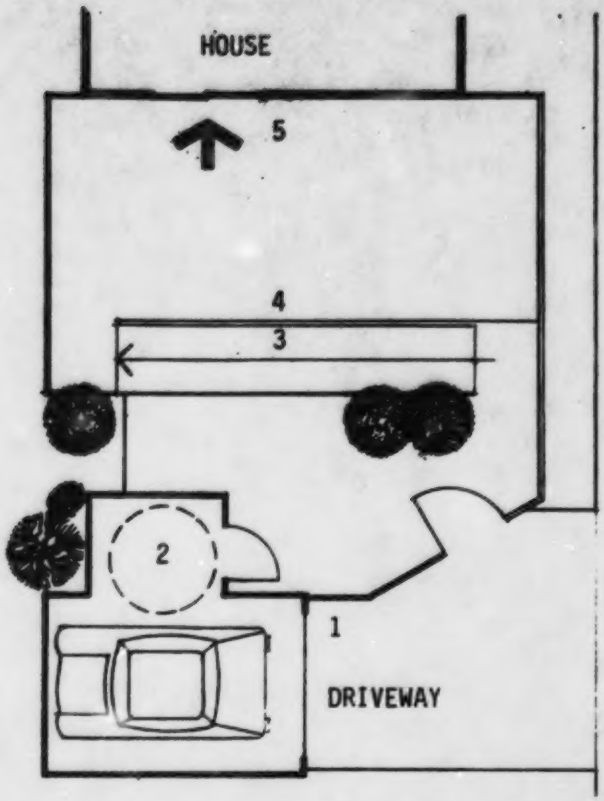
See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1982 dollars) of Disability-Related Features Built During Conversion of an Existing Building

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/			Additional			Additional		
walkways		N/A	area			area		N/A
Parking[1]		3 000	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall		N/A
Ramps[2]		3 500	Common areas			Rear		
Doors		N/A	Lounges			entry[5]		2 200
Paving[3]		700	Laundry			Living		N/A
Other			Elevating			Kitchen[6]		7 000
Handrails		N/A	systems			Bedroom		N/A
Work			Elevators			Bathroom[7]		3 500
bench[4]		100	Ramps			Service		
			Stairs			areas		
			Specialties			Utility		N/A
			Equipment			Storage		N/A
			Services			Other areas		N/A
			Systems			Specialties		
			Other			Equipment		N/A
			Handrails			Services		N/A
			Corner			Systems[8]		10 000.
			guards			Other		
						Corner		
						guards		N/A
		7 300						22 700

Note: The numbered items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility. Only renovations to the ground floor have been included.

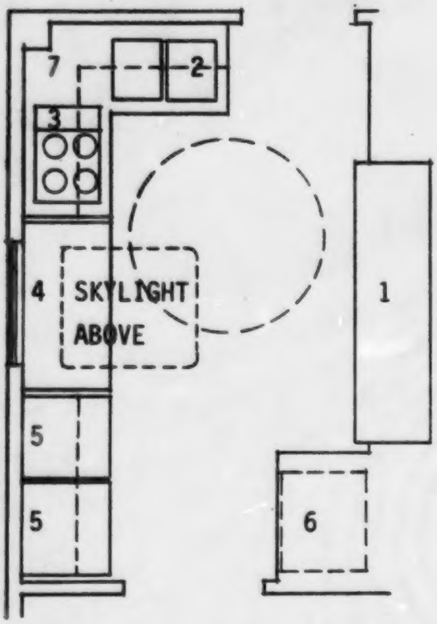
1. Includes an extension of 3 m^2 to side of garage and installation of a remote control door opener.
2. Includes a cedar deck and ramp.
3. Includes 14 m^2 of brick paving.
4. Includes an architecturally designed work bench on the rear deck.
5. Includes a glass double sliding entry door from the rear deck.
6. Total cost of renovation from a dining room to a kitchen, including all special features but excluding the refrigerator and freezer.
7. Total cost of renovation including all special features.
8. Includes a vertical hoist; the provision of an elevator or a hoist with improved safety would substantially increase the cost.


HOUSE
5
4
3
2
1
DRIVEWAY
SIDEWALK

CASE STUDY NO. 2

SITE PLAN

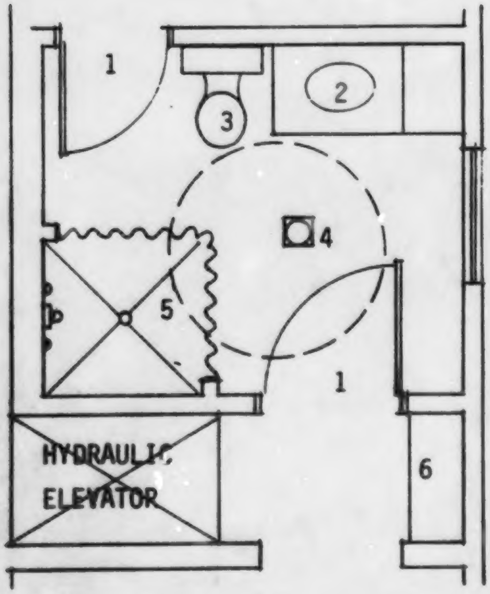
1. Automatic overhead door
2. Addition to garage
3. Ramp
4. Raised patio
5. Sliding entrance doors to family room


7
2
3
4
SKYLIGHT
ABOVE
1
5
5
6

CASE STUDY NO. 2

KITCHEN

1. Work area - open under counter
2. Double sink - open under
3. Counter stove top
4. Pantry with roll-out shelves
5. Separate refrigerator and freezer
6. Built-in oven
7. Adjustable hanging cupboards


1
2
3
4
5
1
HYDRAULIC
ELEVATOR
6

BATHROOM

1. Two doors to bathroom
2. Vanity - open under counter and lever faucets
3. Toilet (no grab bars used)
4. Heat lamp
5. Corner shower
6. Linen closet

CASE STUDY NO. 2 - PHOTOGRAPH

Roll out units provide storage space at user level.

Photograph from Toronto Star, March 24, 1981

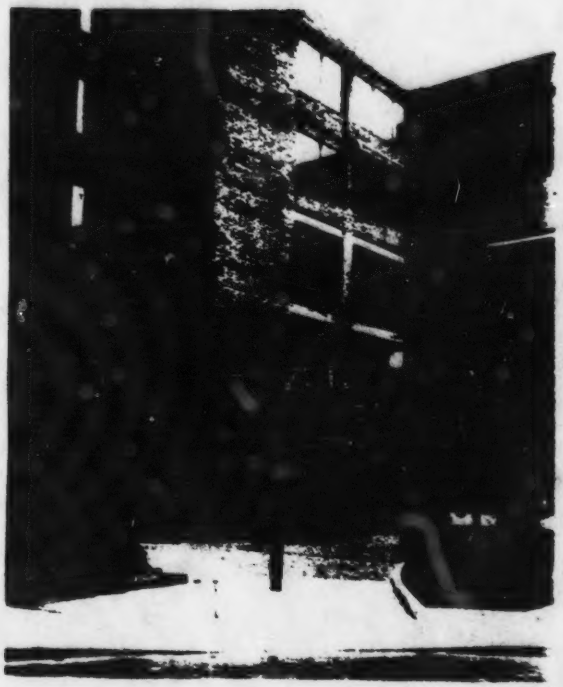
CASE STUDY 3

3

REGION: Central

PROJECT: Apartment (6-storey)
Toronto, Ontario

MODULE 3: Purpose-built - Upgrading Recommended



DESCRIPTION OF USER

The user is a woman in her early twenties living alone in a one-bedroom apartment adapted for a wheelchair user. She has cerebral palsy and is confined to a wheelchair. She requires assistance with transferring, and receives about six hours of nursing/personal care and eight hours of homemaking assistance a week. Interestingly, she stated that she thought she would require much less assistance if her apartment was designed for improved wheelchair mobility. She receives Family Benefits of $367 per month and pays $67 for rent.

DESCRIPTION OF HOUSING

The building is a 6-storey, 207-unit apartment complex with 12 units(2 per floor) designed for wheelchair users. Four of these were adapted after construction but before occupancy and 8 were part of the original design of the building. The user lives in one of the latter. Attendant and homemaking services are available as required. The building was completed in early 1980.

METHOD OF FINANCING

The building was financed under the National Housing Act, Section 56.1 and was constructed by the Toronto Housing Authority.

DISABILITY-RELATED FEATURES

Exterior

There are some underground parking spaces for the disabled. An exterior concrete ramp has railings, and the elevator closing has been slowed.

Interior Public Areas

Standard.

Dwelling Unit

There are long lever handles on the doors, no door sills, sliding doors on cupboards, low rods and shelves in cupboards, low light switches and intercom, and high-level electrical duplex outlets.

The kitchen has one low shelf, low counters, knee clearance under the sink, and lever handles. The bathroom has toilet and bathtub grab bars, a low telephone shower head, a washbasin with knee clearance and lever handle faucets, and a low towel rack on the inside of the door.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

A number of problems were noted by the user and the consultants regarding the functional adequacy of this project for a wheelchair user.

The exterior ramp leading to the building is too narrow and steep and has an inadequate lower and intermediate landing. The main doors are heavy to open, and the intercom, elevator buttons and mailboxes are too high. The user is unable to use the garbage chute because of the way the garbage chute enclosure is designed.

In the apartment general circulation and approach to doors are poor, and the bedroom, bathroom and balcony doors are narrow. The balcony is not deep enough and the guard rail is too high. The peephole on the front door, the fuse box and the heating controls are also too high. The window and balcony door hardware cannot be operated by the user because of their design and location.

In the kitchen, although there is knee clearance under the sink, the approach to the sink prevents the user from manoeuvring her wheelchair under it independently. The faucets are not at the front so she has had to attach ropes to the handles to operate them. There is no counter space with knee clearance. A reaching device is used to reach back oven controls, light switches and items on the overhead shelf. The electrical outlets are not within reach and the upper cupboards are also too high to be used.

The user finds the bathroom somewhat small and the mirror and medicine chest too high. Because of the nature of her disability, she does not use the grab bars. The faucets on the wash basin are not front oriented and she has attached ropes to assist with operating them.

Upgrading Recommended (see floor plans)

Provide door opening assistance devices on two doors, lower the elevator call and cab buttons on all levels, and lower the twelve mail boxes.

Remove the linen closet (provide shelves in bedroom closet) and improve the circulation area.

Remove the kitchen cupboards, counters, shelves and so on, and replace and relocate sink and range to provide improved accessibility.

Replace the sliding window with windows that can be operated by a disabled person.

Make minor changes to the bathroom.

Relocate the heating grill manual controls to a lower level, and relocate the fuses, electrical outlets and services so that they can be used by a disabled person.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

Many of the guidelines for adapted housing have not been adequately met, resulting in the problems noted above.

ADMINISTRATION/CONSTRUCTION

The building was architect-designed and construction was by a general contractor for a fixed-sum contract.

COMMENTS

This case study is an example of a recent, purpose-built construction, the design of which creates considerable problems for the disabled user. Some of the problems relating to limited space and planning cannot be remedied. The initial design could have been improved with little or no expense; however, only major items have been included in the recommended upgrading and estimated cost have been provided.

Existing Information on Costs

The owners report that the construction cost (1980) was approximately $56 000 per unit; costs for the elevator and 10 per cent for disability-related features must be added to this. The fixed-sum contract was $5.2 million. In mid-1982 dollars, this would be approximately $71 000 per unit for a total of $6.6 million.

Cost Estimates (tables 1 and 2)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs per unit	
Disability-related features	$2 755
Upgrading recommended	$4 160
Upgrading costs had the recommended features been incorporated at the time of construction	$2 000

See tables 1 and 2 for detailed cost estimates.

Table 1 Estimated Costs (mid-1982 dollars) of Disability-Related Features Built During Construction

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways	N/A	N/A	Additional area			Additional area[3]	2 000	
Parking[1]	NC	NC	Circulation			Circulation		
Entrance			General			General	N/A	
Steps	N/A	N/A	Corridors			Hall	N/A	
Ramps[2]	500	6 000	Common areas			Living	N/A	
Doors	N/A	N/A	Lounges			Kitchen[4]	35	
Paving	N/A	N/A	Laundry			Bedroom	N/A	
Other			Elevating			Bathroom[5]	155	
Handrails	N/A	N/A	systems			Service		
			Elevators			areas		
			Ramps			Utility	N/A	
			Stairs			Storage	N/A	
			Specialties			Other areas	N/A	
			Equipment			Specialties		
			Services			Equipment	N/A	
			Systems			Services[6]	30	
			Other			Systems[7]	35	
			Handrails			Other		
			Corner			Corner		
			guards			guards	N/A	
	500						2 255	

Note: The numbered items were considered as potentially contributing to additional cost. Cost estimates are based on special features being incorporated in the original construction.

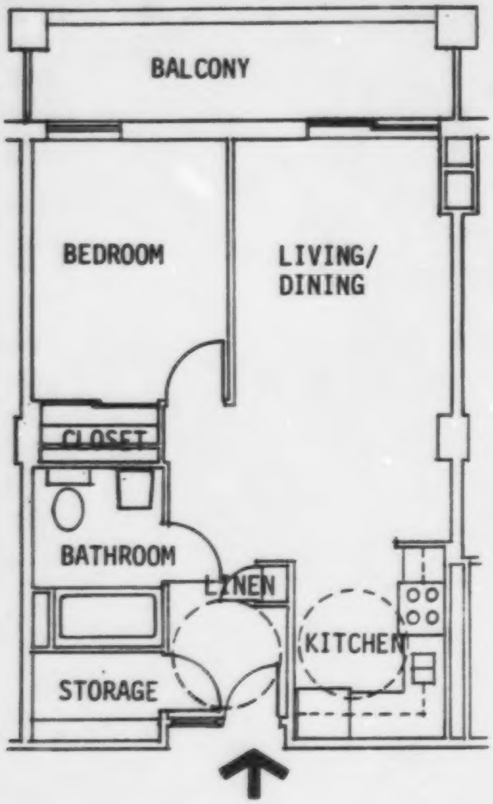
1. Parking is provided as standard within a garage (NC).
2. Includes a concrete ramp complete with handrails.
3. Apartment exceeds a basic gross area of 48 m^2 by 9 m^2.
4. Includes lever faucet handles, low shelf (NC) and counters (NC) with knee clearance (NC).
5. Includes grab rails, lever faucet handles, telephone shower (NC), vanity knee clearance (NC), and a low towel rack (NC).
6. Includes lowered light switches, raised electrical outlets and lowered intercom (NC).
7. Includes levered door handles, no door sills (NC), sliding doors on cabinets (NC) and low rods and shelves in cupboards (NC).

Table 2 Cost Estimates of Recommended Upgrading

Exterior	Per Unit	Total	Interior Public Areas	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/			Additional			Additional		
walkways	N/A	N/A	area	N/A	N/A	area	N/A	
Parking	N/A	N/A	Circulation			Circulation		
Entrance			General	N/A	N/A	General	N/A	
Steps	N/A	N/A	Corridors[1]	N/A	N/A	Hall[5]	900	
Ramps	N/A	N/A	Common areas			Living	N/A	
Doors	85	1 000	Lounges	N/A	N/A	Kitchen[6]	1 700	
Paving	N/A	N/A	Laundry	N/A	N/A	Bedroom[7]	525	
Other			Elevating			Bathroom[8]	300	
Hand-			systems			Service		
rails	N/A	N/A	Elevators[2]	90	1 100	areas		
			Ramps	N/A	N/A	Utility	N/A	
			Stairs	N/A	N/A	Storage	N/A	
			Specialties			Other areas	N/A	
			Equipment	N/A	N/A	Specialties		
			Services[3]	25	300	Equipment	N/A	
			Systems[4]	5	60	Services[9]	500	
			Other			Systems[10]	30	
			Handrails	N/A	N/A	Other		
			Corner			Corner		
			guards	N/A	N/A	guards	N/A	
	85			120			3 955	

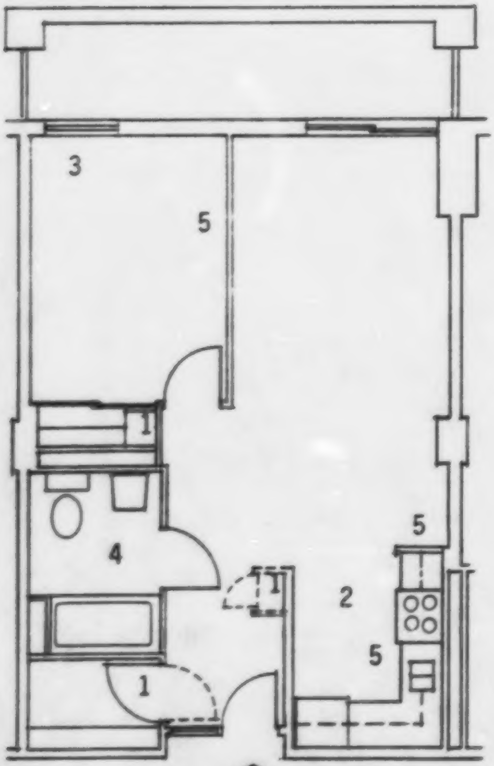
Note: The numbered items were considered necessary to upgrade this dwelling unit. Cost estimates are based on the assumption that the work will all be done at the same time and in one apartment at a time.

1. Includes door opening assistance devices on two doors.
2. Includes lowering call and cab buttons at six levels.
3. Includes providing twelve lowered mail boxes.
4. Includes lowering call buttons at lobby only.
5. Includes removing linen closet to the bedroom and changing the door swing to the storage cupboard.
6. Includes lowering the wall cabinets, creating knee clearance, and providing a lever faucet and stove with front controls and side swing oven door.
7. Includes a crank operated window and lowered heat control.
8. Includes lowering medicine cabinet with its mirror and changing washbasin basin faucets to lever type.
9. Includes providing an electrical outlet at the front of the kitchen counter and lowering the fuse box.
10. Includes lowering the intercom buttons.


BALCONY
BEDROOM
LIVING/
DINING
CLOSET
BATHROOM
LINEN
STORAGE
KITCHEN

CASE STUDY NO. 3

EXISTING APARTMENT



UPGRADING RECOMMENDED

1. Relocate linen closet to bedroom closet, and rehang storage room door to improve circulation.
2. Remove kitchen cupboards and replace; relocate sink and improve accessibility.
3. Replace sliding bedroom window with suitable window for operation by disabled.
4. Make minor changes to bathroom.
5. Relocate manual controls for louvered heating grill, fuse box, electrical outlets and services to improve accessibility.

CASE STUDY NO. 3 - PHOTOGRAPHS

Hign level cupboards and shelf not accessible to user. Reaching device needed for oven controls.

Location of sink is such tnat user cannot independently manoeuvre chair under sink. There is no counter area with knee clearance provided.

CASE STUDIES
ATLANTIC REGION
(Dartmouth/Bedford, Nova Scotia)

CASE STUDY 4
Private Home
Module 2: Conversion

CASE STUDY 5
Private Home
Module 2: Conversion

CASE STUDY 6
Private Home
Module 1: Conversion

CASE STUDY 7
Group Home
Module 1: Conversion

CASE STUDY 4

4

REGION: Atlantic

PROJECT: Private Home (single-storey)
Dartmouth, Nova Scotia

MODULE 2: Conversion - Access-a-Home
and Private Funding

DESCRIPTION OF USER

The user is an eleven-year-old boy, one of a family of four, who is confined to a wheelchair because of muscular dystrophy. His condition had progressed to the point where, for the last year or so, he has been dependent on this parents for all transfers and personal care, but is still able to attend school full-time. He operates his electric wheelchair, writes and eats independently. The parents usually use a lift for bed, toilet and bath transfers. Both his parents are employed and have a combined family income of more than $30 000. They have lived in this house since 1978.

DESCRIPTION OF HOUSING

The home is a detached single-storey wood frame house that the user's father has adapted, doing most of the labour himself. He feels the house is not well suited to his son's needs, but the cost of buying and adapting a larger, more open house, or putting an addition on this house is prohibitive. The renovations were carried out in the winter of 1981, and the spring of 1982.

METHOD OF FINANCING

The family financed the renovations to their home with private funds and a provincial Access-a-Home grant of $1 050. The grant was administratively very easy to obtain. See Appendix 4 for details of this funding program.

DISABILITY-RELATED FEATURES

Exterior

The adaptations made to the exterior of the house included enlarging and enclosing the front porch, which now has a landing and plywood ramp; adding an asphalt ramp and retaining wall at the side of the house to the back yard; and widening the driveway by 1 220 mm to accommodate a van and a portable ramp.

Interior Public Areas

Not applicable.

Dwelling Unit

The wall separating the front entrance from the living room has been removed. The front, kitchen, bathroom, and bedroom doors have been widened, and the front door sill has been lowered.

The bathroom has been enlarged and the sink relocated, to provide space beside the toilet to transfer, by means of a lift. There is knee clearance under the sink/counter, a single lever faucet, and a low mirror. A Jacuzzi bathtub has been installed and elevated 470 mm to allow for the legs of the lift.

An adjustable wooden shelf with knee clearance has been installed in the son's bedroom, to provide a desk/play area.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The side/back ramp is too narrow and the user's father is planning to widen it. There is little space for manoeuvring an electric wheelchair in the hallways, doorways and bedroom, but this cannot readily be corrected. Considering the restrictions, reasonably good accessibility has been achieved. The kitchen is not accessible but this is not considered necessary, as independent meal preparation is not possible for the user.

This case study is a cost effective example of making a home accessible, though not ideally so, for a wheelchair user.

CODE/STANDARDS/REQUIREMENTS/GUIDELINES

The ramps are steep, but the gradient is considered manageable, as the user is either assisted or climbs it without problems in an electric wheelchair. Door widths, after renovation, met the requirements (840 - 890 mm). The enlarged porch exceeds requirements for an entry hall and serves as an area to store the electric wheelchair. It is equipped with an electrical outlet to permit charging of the electric wheelchair.

ADMINISTRATION/CONSTRUCTION

No problems were encountered in applying for and receiving the Access-a- Home grant.

A building permit was obtained prior to making the renovations. The father did much of the labour himself, and some plumbing and plastering work was carried out by sub-contractors.

The bathroom was enlarged by taking about 610 mm from the bedroom next to it. This increased the distance from the toilet to the tub from 430 to 940 mm. The bedroom, bathroom, kitchen and front doorways were widened by altering one side of each doorway. The Jacuzzi was raised on legs to give a 635 mm high bathtub and a 100 mm space underneath to accommodate a lift.

COMMENTS

This case study represents basic accessibility features rather than features that enhance independent functioning, as the user's potential independence is greatly restricted by his progressive disability.

This home demonstrates that a considerable number of effective adaptions for a wheelchair user can be made at relatively small cost, especially when "self labour" is used, as it was in this case.

Existing Information on Costs

The father thought the total cost, including labour, to have been about $10 000. The Jacuzzi, a gift, represents about $2 000 of this amount; approximately $2 000 was spent on plumbing work.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of renovations: $13 000.

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building

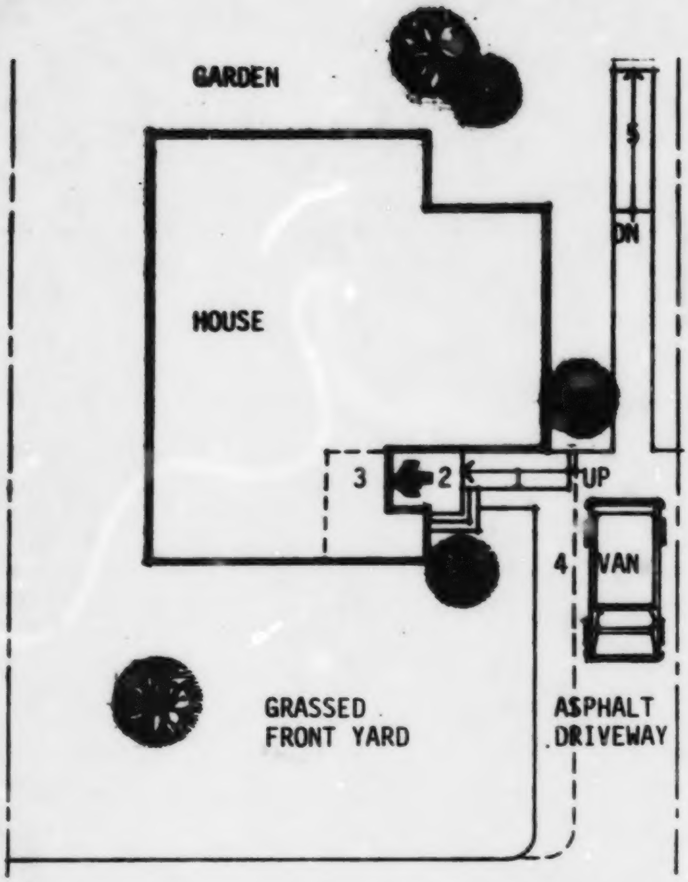
Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/			Additional			Additional		
walkways		N/A	area			area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General[3]		1 000
Steps		N/A	Corridors			Hall[4]		4 800
Ramps[1]		900	Common areas			Living		N/A
Doors		N/A	Lounges			Kitchen		N/A
Paving[2]		1 600	Laundry			Bedroom[5]		200
Other			Elevating			Bathroom[6]		4 500
Hand-			systems			Service		
rails		N/A	Elevators			areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment		N/A
			Systems			Services		N/A
			Other			Systems		N/A
			Handrails			Other		
			Corner			Corner		
			guards			guards		N/A
						Balcony		
						sill ramp		N/A
						Balcony		
						elevating		
						ramp		N/A
		2 500						10 500

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility.

1. Includes ramp, landing and stairs at front entrance.
2. Includes 24 square meters of paving and construction of a ramp into the garden.
3. Includes widening 4 interior doors.
4. Includes enclosing the front porch, lowering the sill of the door leading into the hall and removal of a wall at the living room.
5. Includes an adjustable work table in one bedroom.
6. Includes the total cost of the bathroom improvements including the Jacuzzi tub.

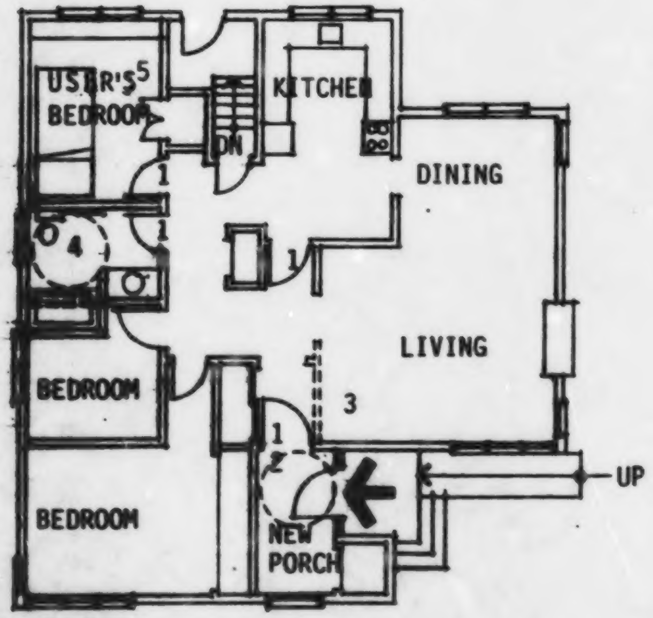
CASE STUDY NO. 4

SITE PLAN


GARDEN
HOUSE
5
DN
3
2
UP
4
VAN
GRASSED FRONT YARD
ASPHALT DRIVEWAY

1. New ramp at entrance.
2. Ramp landing.
3. Enclosed front porch addition.
4. Driveway widened by 1220 mm to accommodate van and portable ramp.
5. New asphalt ramp leading to garden at rear.

FLOOR PLAN


USER'S BEDROOM
5
KITCHEN
DN
DINING
1
1
4
1
LIVING
BEDROOM
3
1
2
BEDROOM
NEW PORCH
UP

1. Doors widened.
2. Door sill lowered.
3. Partition removed.
4. Bathroom enlarged, sink relocated to provide space for wheelchair beside toilet; jacuzzi bathtub and low mirror installed.
5. Adjustable wooden shelf with knee clearance.

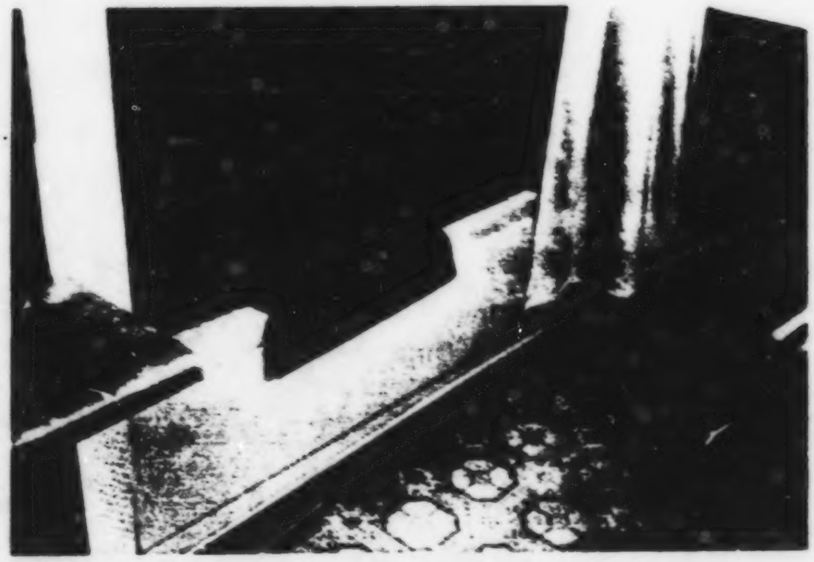
CASE STUDY NO. 4 - PHOTOGRAPHS

Asphalt ramp and retaining wall at side of house to the back yard.

Enlarged and enclosed front porch, with landing and plywood ramp.

CASE STUDY NO. 4 - PHOTOGRAPHS

Toilet relocated to permit wheelchair transfer.



Jacuzzi raised to accommodate feet of user lift.

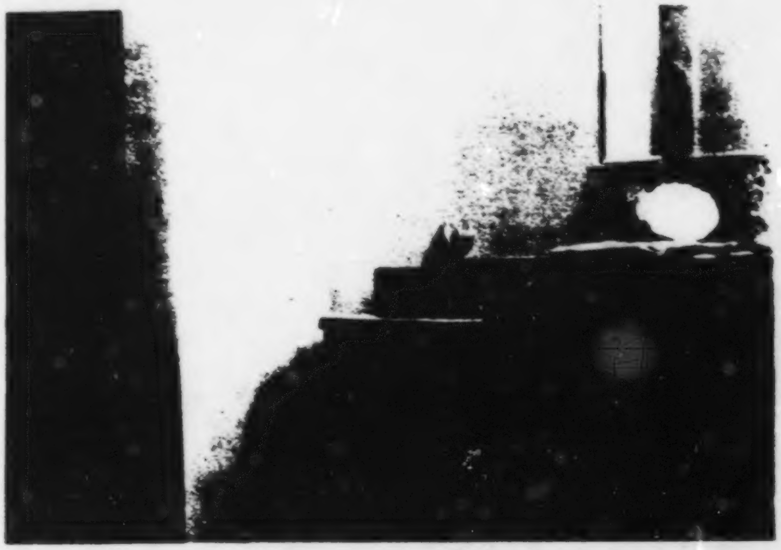
CASE STUDY 5

5

REGION: Atlantic

PROJECT: Private Home (single-storey)
Bedford, Nova Scotia

MODULE 2: Conversion - Access-a-Home
and Private Funding



DESCRIPTION OF USER

The user is a married man in his mid-thirties, who sustained an injury in December 1980 and is now a C-6,7 quadraplegic, confined to a wheelchair. Following his injury, he and his wife moved in September 1981 from their 2-storey house in Alberta to a single level home in Nova Scotia, where their families reside. In the hospital, he was able to demonstrate independence in transferring and personal care, but since returning home his wife assists him in all these functions, and performs all household tasks. They have an annual income of $15 000 - $20 000, including insurance and disability pensions.

DESCRIPTION OF HOUSING

The home is a new (1979) single-storey detached house which, by the nature of its spacious open design, presents few obstacles for a wheelchair user. However, the bathroom off the master bedroom was not originally accessible and, therefore, has been enlarged and renovated. The renovations were carried out in February and March of 1982.

METHOD OF FINANCING

The bathroom renovations were financed with a provincial Access-a-Home grant of $1 050 and private funds. The grant was administratively very easy to obtain. See Appendix 4 for details of this funding program.

DISABILITY-RELATED FEATURES

The bathroom was renovated and enlarged to include a doorway 1 020 mm wide, a large wheelchair telephone-type shower, and a vanity/washbasin with knee clearance, and lever handle faucets.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The user is satisfied with the bathroom renovations. It was noted, however, that no space allowance for a toilet transfer was made, but this particular user transfers with assistance to a toilet chair to use the toilet. A lever rather than a dial shower faucet would have been desirable. It should be noted that the user is willing to rely on his wife for assistance in transfers and personal care; he does not, therefore, consider these aspects a problem.

For a relatively small amount of money the bathroom of this home was made accessible to the disabled homeowner. Much of the labour was provided by a family member, adding to the cost effectiveness of the work.

CODE/STANDARDS/REQUIREMENTS/GUIDELINES

Note comments under Functional Adequacy above which indicate areas in which guidelines were not followed. It was also noted that no allowance was made for regulating the temperature of the water, and that the pipes under the washbasin are not insulated.

ADMINISTRATION/CONSTRUCTION

No problems were encountered in applying for and receiving the Access-a-Home grant. Refer to Appendix 4 for specifics of this particular funding program.

A relative provided much of the labour for the bathroom renovations. All the plumbing fixtures were moved, and the wheelchair shower was installed in what used to be a closet.

COMMENTS

Only very small changes have been necessary in this home because of its spacious, open design, and the user's willingness to rely on his wife for most aspects of personal care and homemaking.

This is a good example of how attitudes as well as abilities will determine the desirable adaptions. For example, neither the user nor his wife want changes made to the kitchen, as they fully expect that he will not be involved in meal preparation. This emphasizes the importance of looking at changes the user and other occupants consider desirable; an objective assessment and evaluation of changes required according to standards or guidelines of designing for disabled persons is not always the best way.

Existing Information on Costs

Over $2 000 was spent on materials with the user's relative performing much of the labour. The total cost was estimated by the user at $3 500 - $4 000, with $1 050 of this financed by a provincial Access-a-Home grant.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of renovations: $3 200.

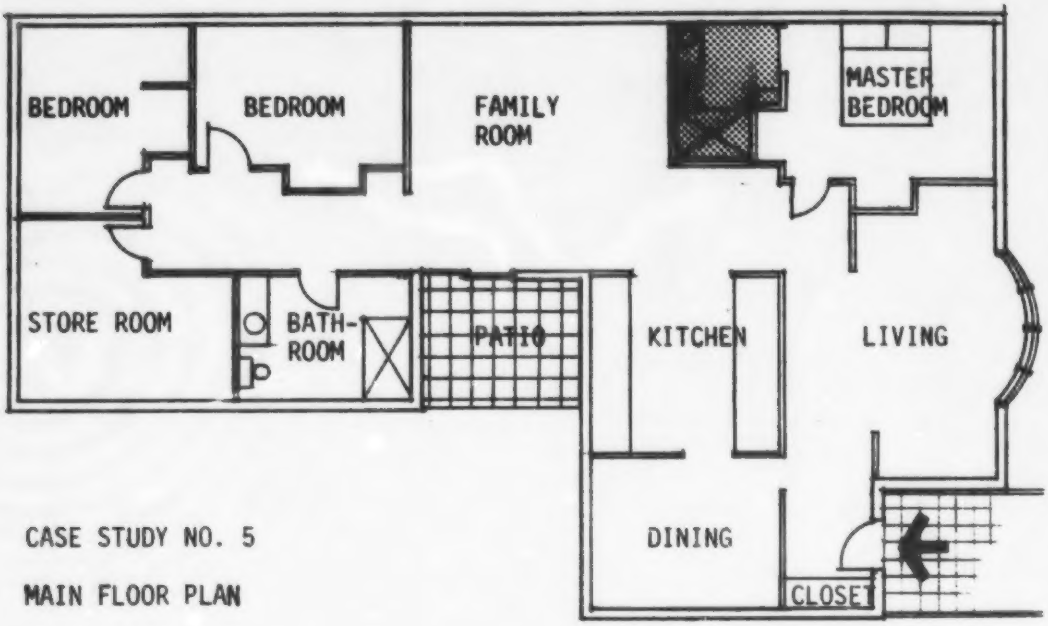
See table 1 for detailed cost estimates.

Table 1 **Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building**

Exterior N/A	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways			Additional area			Additional area	N/A	
Parking			Circulation			Circulation		
Entrance			General			General	N/A	
Steps			Corridors			Hall	N/A	
Ramps			Common areas			Living	N/A	
Doors			Lounges			Kitchen	N/A	
Paving			Laundry			Bedroom	N/A	
Other			Elevating systems			Bathroom[1]	3 200	
Hand-rails			Elevators			Service areas		
			Ramps			Utility	N/A	
			Stairs			Storage	N/A	
			Specialties			Other areas	N/A	
			Equipment			Specialties		
			Services			Equipment	N/A	
			Systems			Services	N/A	
			Other			Systems	N/A	
			Handrails			Other		
			Corner guards			Corner guards	N/A	
						Balcony sill ramp	N/A	
						Balcony elevating ramp	N/A	
							3 200	

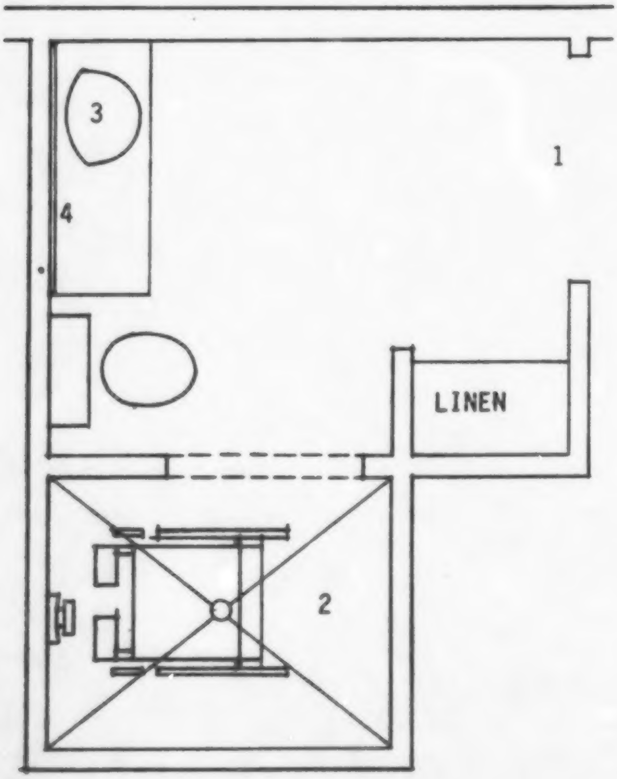
Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility.

1. Includes creating a wheelchair shower in place of an existing closet and renovating the existing washroom to incorporate other disability features including a telephone shower, vanity/washbasin with knee clearance and lever handle faucets.


BEDROOM
BEDROOM
FAMILY ROOM
MASTER BEDROOM
STORE ROOM
BATH-ROOM
PATIO
KITCHEN
LIVING
DINING
CLOSET

CASE STUDY NO. 5

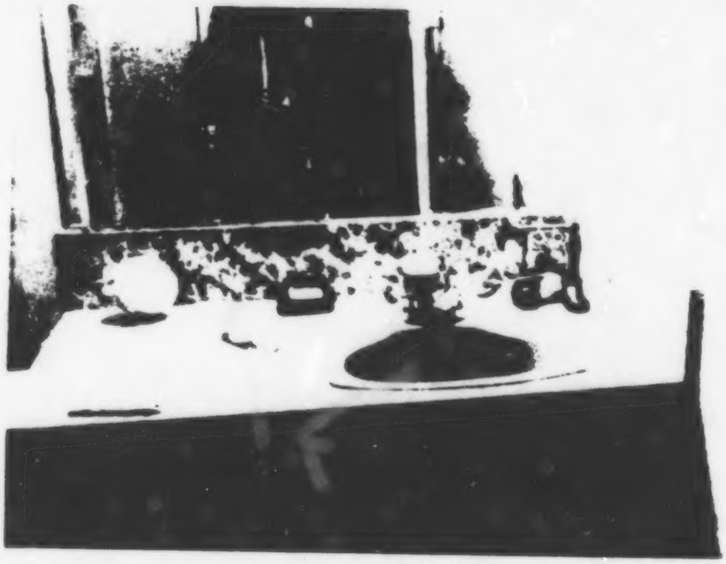
MAIN FLOOR PLAN



BATHROOM

1. Doorway widened to 1020 mm.
2. Wheelchair shower installed in existing closet; overhead light in shower.
3. Vanity open under counter; lever handle faucets.
4. Low mirror over vanity.

CASE STUDY NO. 5 - PHOTOGRAPHS



In addition to wheelchair shower, new wash basin/vanity with knee clearance and lever handle faucet.

CASE STUDY 6

6

REGION: Atlantic

PROJECT: Private Home (2-storey)
Dartmouth, Nova Scotia

MODULE 1: Conversion - RRAP, Access-a-Home and Private Funding

DESCRIPTION OF USER

The user has had both legs amputated and has been confined to a wheelchair since mid-1981. He is independent in all transfers, personal care and meal preparation, but his wife does the laundry, cleaning and shopping. He is a retired carpenter in his mid-seventies, and they have an annual income in the $8 000 - $15 000 range from pensions and taking in boarders.

DESCRIPTION OF HOUSING

The user built his 2-storey woodframe house in 1953. Following his recent confinement to a wheelchair, renovations were necessary to permit entry into his home and use of the bathroomn. These renovations were completed in December 1981.

METHOD OF FINANCING

RRAP funding ($3 750 forgivable) was obtained for the renovations. A provincial Access-a-Home grant ($1 350) and private funds ($5 771) were also obtained. See Appendix 4 for details on RRAP and Access-a-Home funding.

DISABILITY-RELATED FEATURES

Exterior

A 1:12 wooden ramp, handrails, landing and steps were added to the back of the house; an addition containing a bathroom and porch/laundry facilities was also built.

Interior Public Areas

Not applicable.

Dwelling Unit

The addition contained an accessible bathroom consisting of a toilet, washbasin and shower stall. The door is 810 mm with no doorsill, the washbasin has long lever handles, knee clearance and a low mirror, and there are two grab bars — a vertical one in the shower stall and a horizontal one to the left of the toilet. The water temperature in the shower is controlled.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The user is satisfied with the renovations. The only problem he noted with the bathroom is the shower grab bar. He would have preferred it to be horizontal and it should be more firmly secured. In addition, it was noted that there is a lip on the shower stall, which means that the user has to do a forward transfer to a locked shower chair in the shower stall followed by a 180° turn. This seems potentially hazardous. There is no space beside the toilet for a transfer, requiring that the user turn 180° in his wheelchair and do a backward transfer onto the toilet.

Despite the design problems, this seems to be a reasonably cost-effective solution to the problem of making this house accessible and usable for the disabled occupant.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The ramp meets code requirements (1:12). Certain aspects of the bathroom do not meet suggested guidelines for bathroom design and result in the problems noted in Functional Adequacy above.

ADMINISTRATION/CONSTRUCTION

No problems were encountered in obtaining RRAP or Access-a-Home funding. For details of these funding programs refer to Appendix 4.

The construction was carried out by a general contractor, for a fixed-sum contract.

COMMENTS

Although problems were noted regarding the accessibility of the house and the renovations, the user is entirely satisfied. The minimum renovations will permit him to remain in the home he built although he noted he cannot now use the second storey of the house. They have no plans, however, to do additional renovations.

Existing Information on Costs

The cost of the renovations was quoted as $10 871. The breakdown provided was $7 186 for woodworking, $735 for electrical work and $2 950 for plumbing and heating.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of renovations: $12 000.

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall[2]		3 300
Ramps[1]		1 800	Common areas			Living		N/A
Doors		N/A	Lounges			Kitchen		N/A
Paving		N/A	Laundry			Bedroom		N/A
Other			Elevating systems			Bathroom[3]		4 900
Hand-rails		N/A	Elevators			Service areas		
			Ramps			Utility[4]		2 000
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment		N/A
			Systems			Services		N/A
			Other			Systems		N/A
			Handrails			Other		
			Corner guards			Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		1 800						10 200

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility.

1. Includes a wood deck, ramp, handrail and stair.

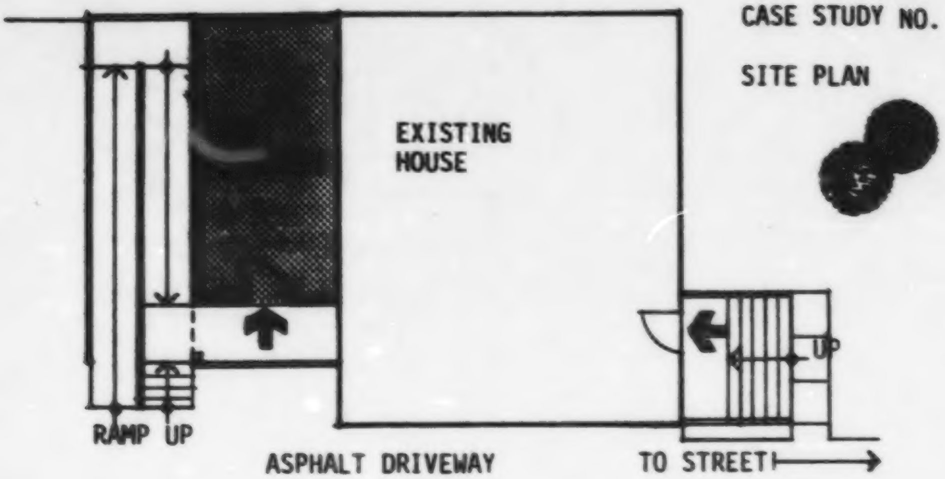
2. Includes a pro rata portion of the rear addition.

3. Includes a pro rata portion of the rear addition plus all interior bathroom finishes.

4. Includes a pro rata portion of the rear addition plus plumbing and electrical connection for the laundry.

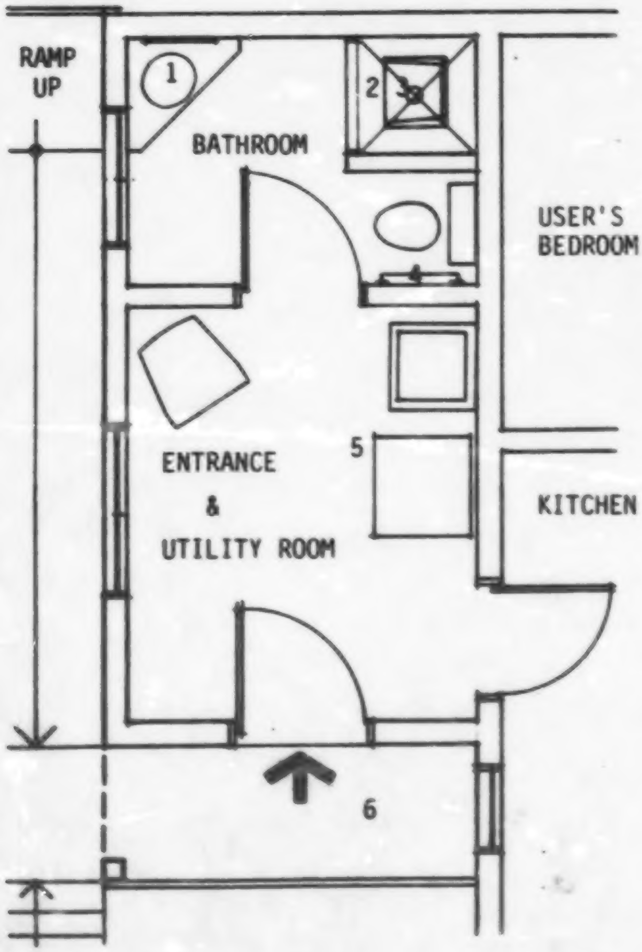
CASE STUDY NO. 6

SITE PLAN

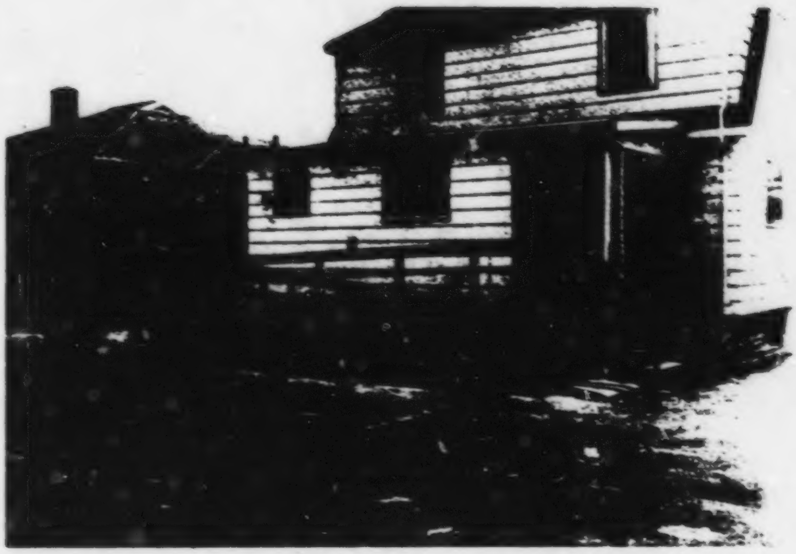

EXISTING HOUSE
UP
RAMP UP
ASPHALT DRIVEWAY
TO STREET

NEW ADDITION

1. Vanity with lever-handle faucets, low mirror, and knee space under.
2. Shower
3. Commode chair stored in shower
4. Horizontal grab bar
5. Laundry facilities
6. Entrance Deck, with roof over. Stairs and a ramp lead up to deck (915mm above ground level).


RAMP UP
1
2
3
BATHROOM
4
USER'S BEDROOM
5
ENTRANCE & UTILITY ROOM
KITCHEN
6

CASE STUDY NO. 6 - PHOTOGRAPHS



Addition to rear of house including accessible washroom, laundry facilities and a landing, ramp and handrails.

New wash basin/ vanity with knee clearance, goose neck faucet and long lever handles.

CASE STUDY 7

7

REGION: Atlantic

PROJECT: Group Home (3-storey)
Dartmouth, Nova Scotia

MODULE 1: Conversion - RRAP and National Housing Act (Section 56.1) Funding

DESCRIPTION OF USER

The supervisor of the home was interviewed because the user does not talk. The user is a man in his late twenties, who is severely mentally retarded, and who uses a wheelchair because he has cerebral palsy. He is one of eight other mentally retarded adults living in this home and he has lived here for about one year. He is the only resident who uses a wheelchair, but he is also able to crawl and stand with assistance. He usually requires supervision from the resident staff in transferring, eating and personal care. He helps with household chores and attends a sheltered workshop five days a week, for which he receives some payment. The home receives a per diem of $62 per resident from the municipality, as well as a comfort allowance of $50 per month per resident.

This home is one of eight homes run by a service society which provided a continuum of care for developmentally disabled aults. This particular home is for those who have relatively low functioning and who also have medical problems.

DESCRIPTION OF HOUSING

The home is a 3-storey woodframe detached house on a corner lot, purchased in 1979 and renovated for use as a group home in 1980. The design of the house is such that the existing doorways, hallways and most rooms permit good wheelchair mobility. The third storey of the house is not used by the residents or staff.

METHOD OF FINANCING

The purchase and renovations of the home were funded by a combination of RRAP and National Housing Act (Section 56.1) financing. The eight-bed home was eligible for $13 750 in RRAP funds.

DISABILITY-RELATED FEATURES

Exterior

A wooden ramp and handrails were added at the back door; a concrete landing was added at the bottom of the ramp, and a sloped concrete sidewalk to the existing and front sidewalk.

Interior Public Areas

Not applicable.

Dwelling Unit

Only two small alterations were made that relate to wheelchair accessibility. Two grab bars (actually towel racks) were added in the ground floor bathroom - one vertically beside the toilet and one vertically in the bathtub. The other item is a lowered rod in the user's bedroom closet.

All the remaining renovations carried out related to general repairs and the use of the house as a group home in accordance with the Building Regulation requirements for a group home. These included:

- installation of fire detectors
- replacement of existing doors with fire-rated room doors
- enclosure of stairway
- installation of exit signs and fire alarm system
- enclosure of furnace room.

In addition, the rear stairway to the third floor apartment was separated from the remainder of the house to provide a private entrance. The kitchen was enlarged, a window installed and a door added.

The general repairs carried out included electrical, plumbing, roofing and flooring; both the interior and exterior of the house were painted.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The very few renovations that were made to accommodate the disabled user permit him to have access by wheelchair to the home by the back ramp. However, he does not have access to the second storey, and the kitchen and bathroom are not well suited to his needs. Although he is likely to continue to need some assistance and supervision, some additional renovations would probably increase his potential independence. As he is the only wheelchair user, and is likely to continue requiring assistance because of the nature of his medical and developmental impairment, it is unlikely that additional renovations will be carried out.

This case study represents a reasonably cost-effective solution to providing housing for eight developmentally disabled adults, even in light of the estimation that 80 per cent of the renovations carried out were in compliance with group home regulations and were not made specifically for the disabled user.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The house meets provincial requirements for a group home. Regarding requirements for wheelchair users, no attempt was made to make the house fully wheelchair accessible as this is not the main disability of the users. The back ramp gradient was steeper than standards recommend but the user would require assistance to ascend the ramp no matter what its gradient.

ADMINISTRATION/CONSTRUCTION

Construction was by general contractor arranged by a consultant from a non-profit housing service association.

COMMENTS

This case study is an example of the type of renovations necessary to adapt a house for use as a group home. In provinces where group homes are not considered institutions, many of the renovations (especially those related to fire regulations) would not be necessary, and the cost of renovations would be much less.

Existing Information on Costs

The house was purchased in 1979 for $71 760 and the renovations cost approximately $60 000 in 1980. It was estimated that 80 per cent of this cost related to fire regulations and non-user oriented repairs.

Cost Estimates (table 1)
Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of Estimated Costs

Disability-related features	$ 1 175
Code requirements (not related to disability)	$25 000
General repairs/renovations (not related to disability	$45 000
	$71 175

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area	N/A	
Parking		N/A	Circulation			Circulation		
Entrance			General			General	N/A	
Steps		N/A	Corridors			Hall	N/A	
Ramps[1]		1 100	Common areas			Living	N/A	
Doors		N/A	Lounges			Kitchen	N/A	
Paving		N/A	Laundry			Bedroom[2]	25	
Other			Elevating systems			Bathroom[3]	50	
Handrails		N/A	Elevators			Service areas		
			Ramps			Utility	N/A	
			Stairs			Storage	N/A	
			Specialties			Other areas	N/A	
			Equipment			Specialties		
			Services			Equipment	N/A	
			Systems			Services	N/A	
			Other			Systems	N/A	
			Handrails			Other		
			Corner guards			Corner guards	N/A	
						Balcony sill ramp	N/A	
						Balcony elevating ramp	N/A	
		1 100					75	

Note: The numbered items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility at the time of other major renovations.

1. Includes a wooden ramp, handrails and concrete landing.

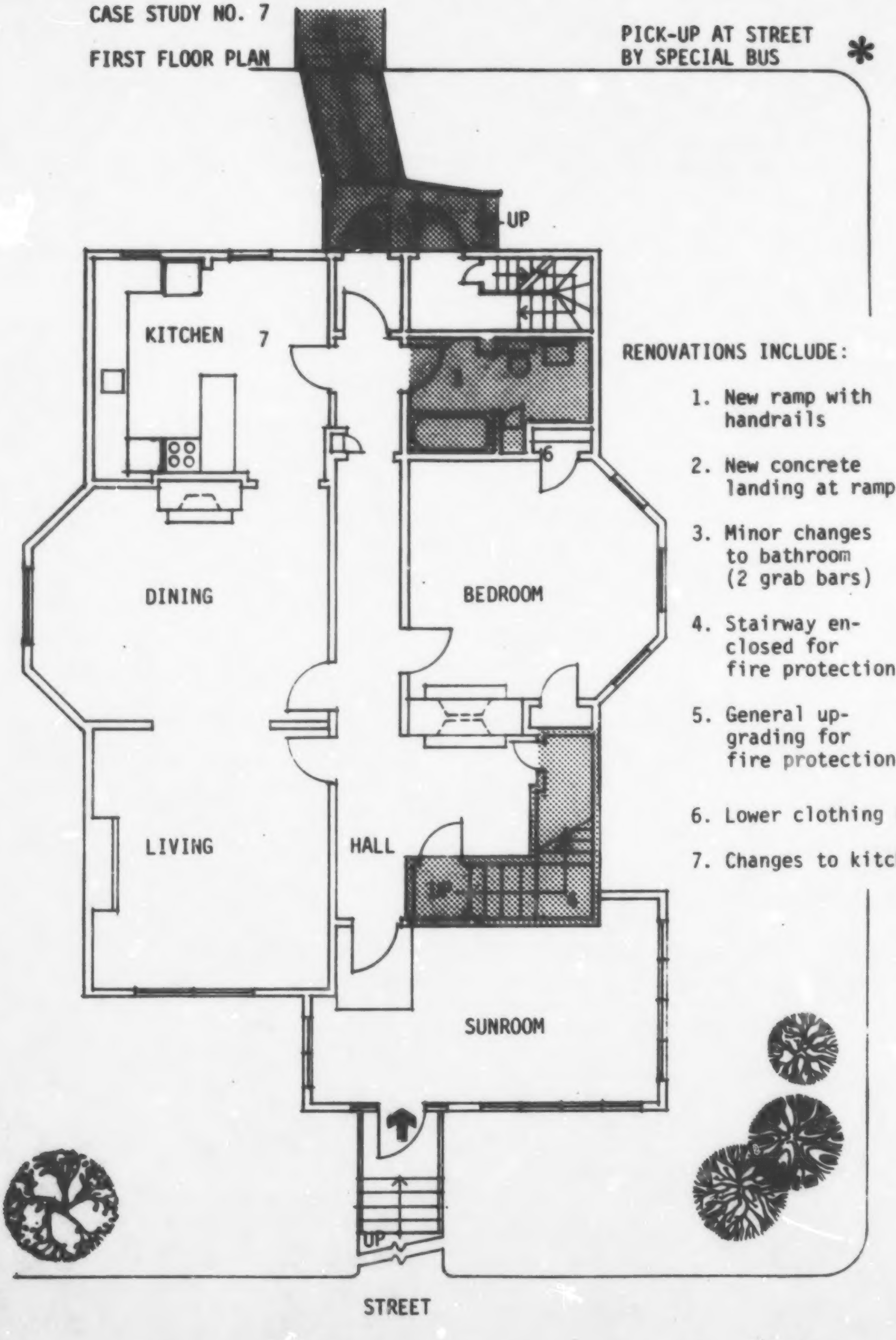
2. Includes lowering the clothes rod in the user's bedroom closet.

3. Includes installation of two towel racks as grab bars in the first floor washroom.

7

CASE STUDY NO. 7

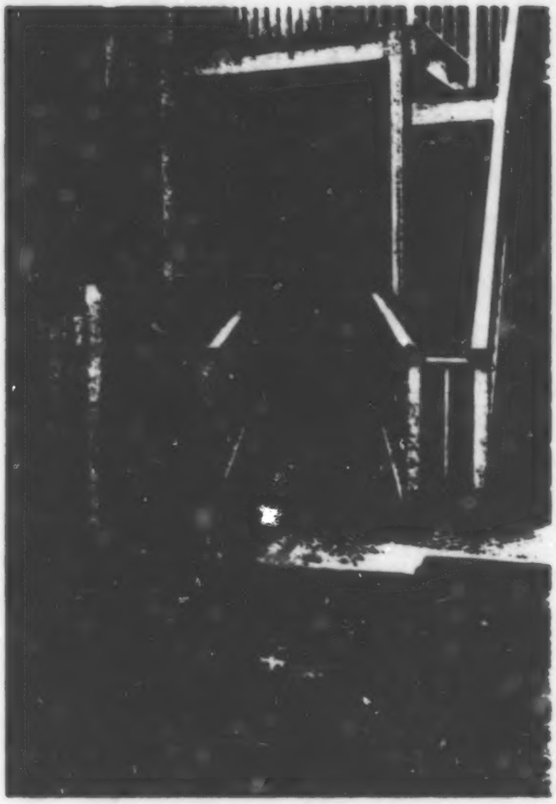
FIRST FLOOR PLAN


PICK-UP AT STREET
BY SPECIAL BUS
*
UP
KITCHEN
7
6
DINING
BEDROOM
LIVING
HALL
SUNROOM
UP
STREET

RENOVATIONS INCLUDE:

1. New ramp with handrails
2. New concrete landing at ramp
3. Minor changes to bathroom (2 grab bars)
4. Stairway enclosed for fire protection
5. General upgrading for fire protection
6. Lower clothing rod.
7. Changes to kitchen.

CASE STUDY NO. 7 - PHOTOGRAPHS



Wooden ramp at rear of house with handrails and concrete landing and sidewalk.

"Access-a-bus" service with electric lift pick-up, at side driveway entrance.

CASE STUDIES
WEST COAST REGION
(Vancouver, British Columbia)

CASE STUDY 8
Group Home
Module 1: Conversion

CASE STUDY 9
Apartment/Transitional Residence
Module 4: Purpose-built

CASE STUDY 10
Group Home
Module 1: Conversion

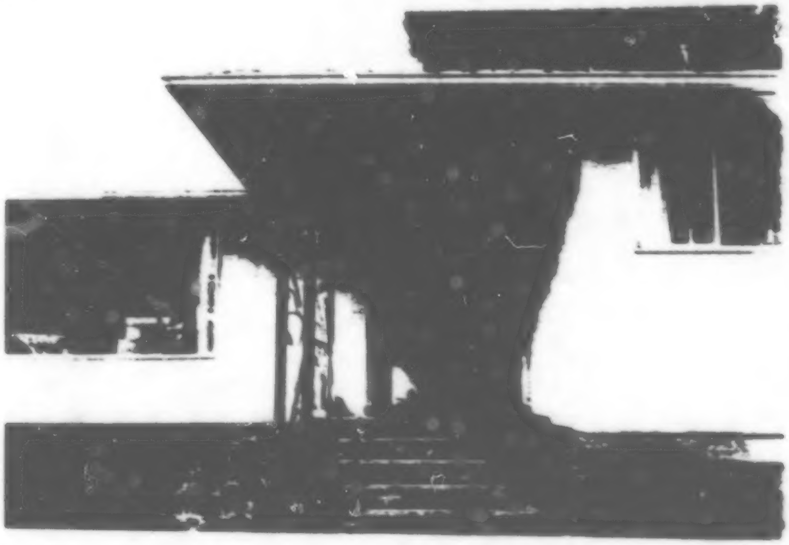
CASE STUDY 8

8

REGION: West Coast

PROJECT: Group Home (single-storey)
Vancouver, British Columbia

MODULE 1: Conversion - RRAP and National Housing Act (Section 56.1) Funding



DESCRIPTION OF USER

The user is a woman in her early sixties who has suffered from progressive rheumatoid arthritis for the last ten years, and is now confined full time to a wheelchair. She has recently become much worse and now requires near total care (transfers, bed baths, bedpans). She is able to eat and write independently and can push her wheelchair with some difficulty, but no longer leaves the house. She takes considerable responsibility as house leader and organizer. She receives about $450 a month disability pension and pays 25 per cent for rent.

There are five other disabled persons in the home: one is quadraplegic, one paraplegic, two are semi-ambulatory, and one is blind. Live-in attendant/homemaker care is provided twenty-four hours a day.

DESCRIPTION OF HOUSING

The house is a single-storey six-bedroom detached wood frame and stucco structure. It has a stepped front entry, rear entry from the main floor deck and a grade-level rear entry to the basement. It was purchased by a non-profit community organization that serves disabled persons and was renovated in 1977 to accommodate wheelchair users. The main floor is spacious and open, permitting easy movement of wheelchairs. Movement is more restricted in the basement.

METHOD OF FINANCING

The purchase and renovation of the house were financed by a combination of RRAP and National Housing Act (Section 56.1) financing.

DISABILITY-RELATED FEATURES

Exterior

A wooden ramp and handrails were added from the main floor back deck to the back yard, with a return to the rear entry to the basement.

Interior Public Areas

Not applicable.

Dwelling Unit

The open basement with bathroom was renovated to include four bedrooms, a recreation area, a bathroom and a separate wheelchair telephone type shower. The interior stairs were removed, a vertical hoist added, and an intercom system installed in all the bedrooms. No work was done on the main floor.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The users find the ramp somewhat steep but manageable. Wheelchair mobility is poor in the basement area and the kitchen is not adapted. This is not important to the particular user interviewed as she uses only the main floor and her disability is too severe to permit independent meal preparation. Although the renovations are not ideal and do not attempt to provide total wheelchair accessibility, this case study is an example of how usable wheelchair-accessible housing can be provided in a very cost-effective manner.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The hoist does not appear to meet code requirements and there is some concern as to its safety, but the users find it adequate. The ramp gradient is somewhat steep but, again, the users find it manageable. Requirements for doorway/hallway widths and approaches are not met in some areas of the basement resulting in the difficulties noted in Functional Adequacy above.

ADMINISTRATION/CONSTRUCTION

Construction was by a general contractor, and renovations were completed within four months of the date of purchase.

COMMENTS

This case study is an example of how low-cost converted housing can be provided for disabled persons. Although renovations are not ideal, the house is nevertheless rendered liveable and usable for wheelchair users.

Existing Information on Costs

The total combined CMHC and RRAP loan (1977) was for approximately $113 000. This includes the purchase price of the house - about $98 000 - and about $15 000 for renovations. The hoist represents about $2 500 of the renovations. Approximately $4 000 of the loan is forgivable RRAP.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of Estimated Costs	
Disability-related features	$12 300
Basement renovations	$20 000
	$32 300

See table 1 for detailed cost estimates.

Table 1 **Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building**

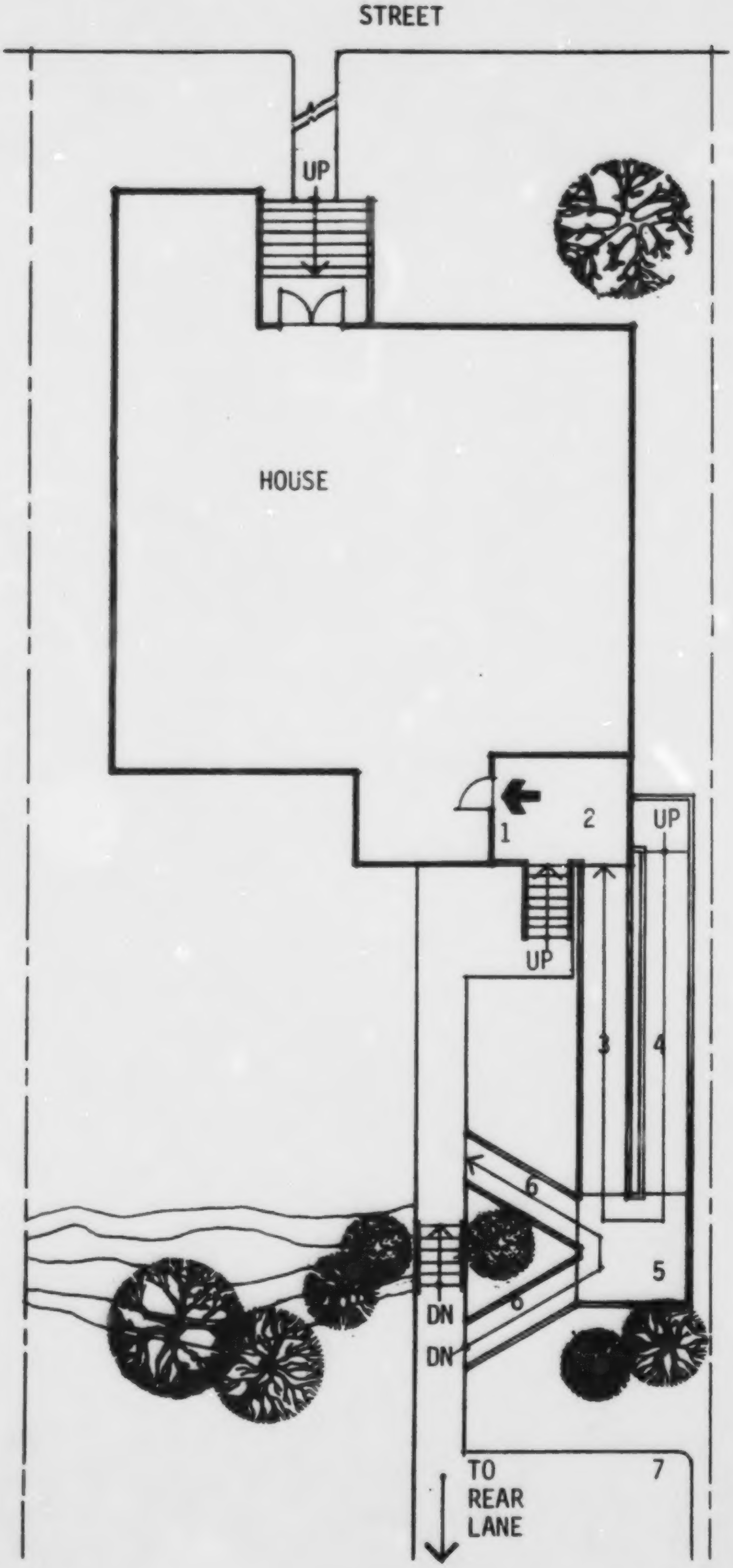
Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall		N/A
Ramps[1]		4 700	Common areas			Living		N/A
Doors		N/A	Lounges			Kitchen		N/A
Paving		N/A	Laundry			Bedroom		N/A
Other			Elevating systems			Bathroom[2]		1 600
Hand-rails		N/A	Elevators			Service areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment		N/A
			Systems			Services		N/A
			Other			Systems[3]		6 000
			Handrails			Other		
			Corner guards			Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		4 700						7 600

Note: The numbered items were considered as potentially contribution to additional cost. Cost estimates are based on converting an existing facility.

1. Includes wooden, asphalt and concrete ramps and retaining walls and handrails from the existing deck and stairs down to but not under the deck.

2. Includes a wheelchair shower.

3. Includes an intercom between two units and a vertical hoist; the provision of an elevator or a hoist with improved safety features would substantially increase cost.


STREET
UP
HOUSE
1
2
UP
UP
3
4
6
6
5
DN
DN
7
TO
REAR
LANE

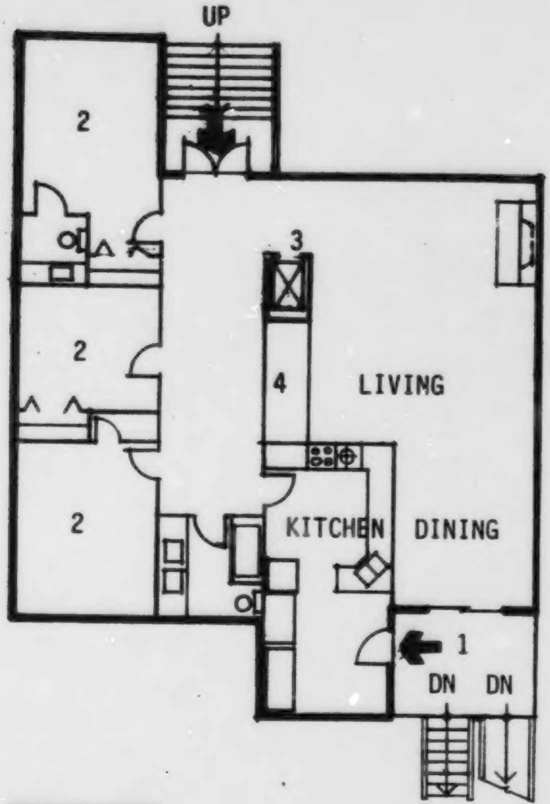
CASE STUDY NO. 8

SITE PLAN

1. Rear entrance to house is main entrance for disabled.
2. Porch at main floor level with roof over.
3. Wood ramp leading up to main floor.
4. Ramp leading down to basement level.
5. Concrete ramp landing.
6. Ramps leading to garden path.
7. Parking area.

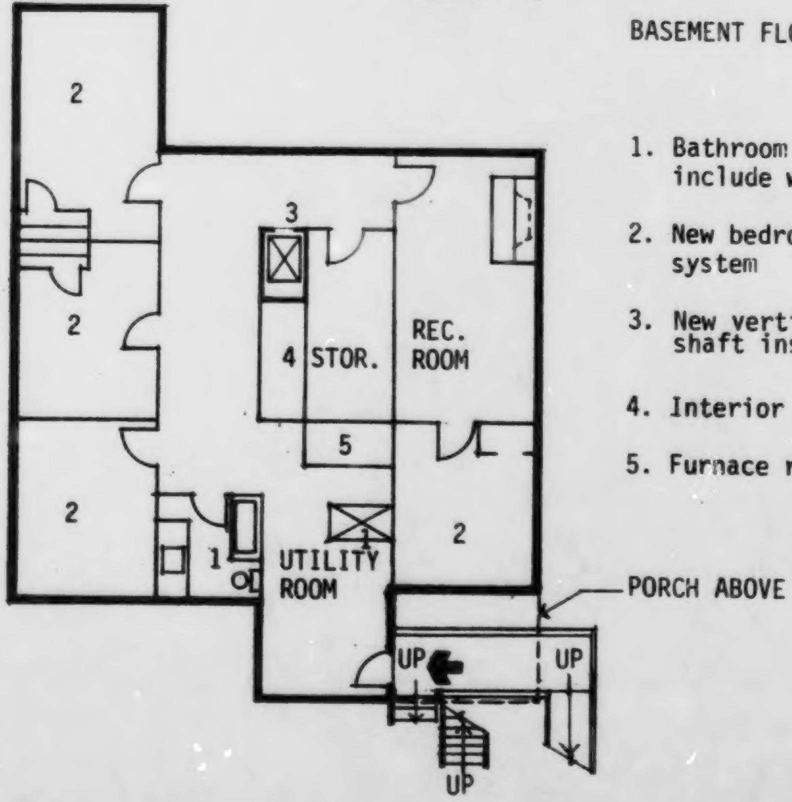
CASE STUDY NO. 8

MAIN FLOOR PLAN


UP
2
2
2
3
4
LIVING
KITCHEN
DINING
1
DN
DN

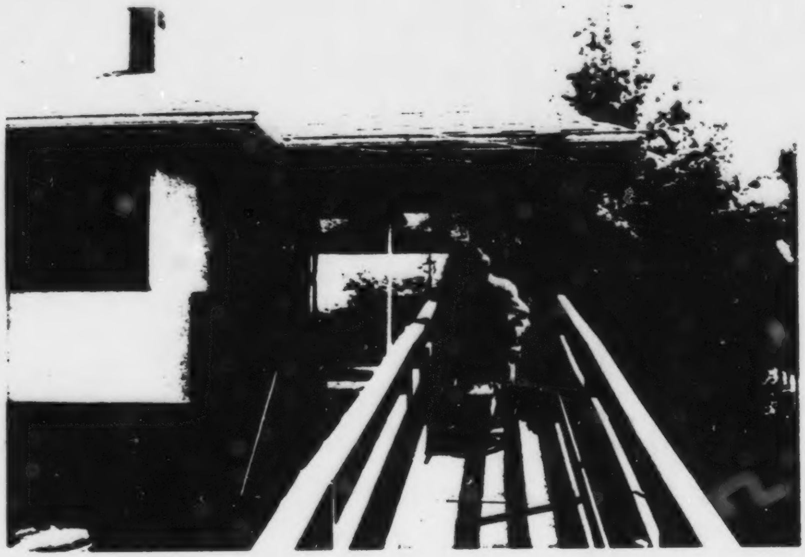
1. Porch with roof over
2. Bedrooms with intercom system
3. New vertical hoist and shaft installed
4. Interior stairs removed

BASEMENT FLOOR PLAN

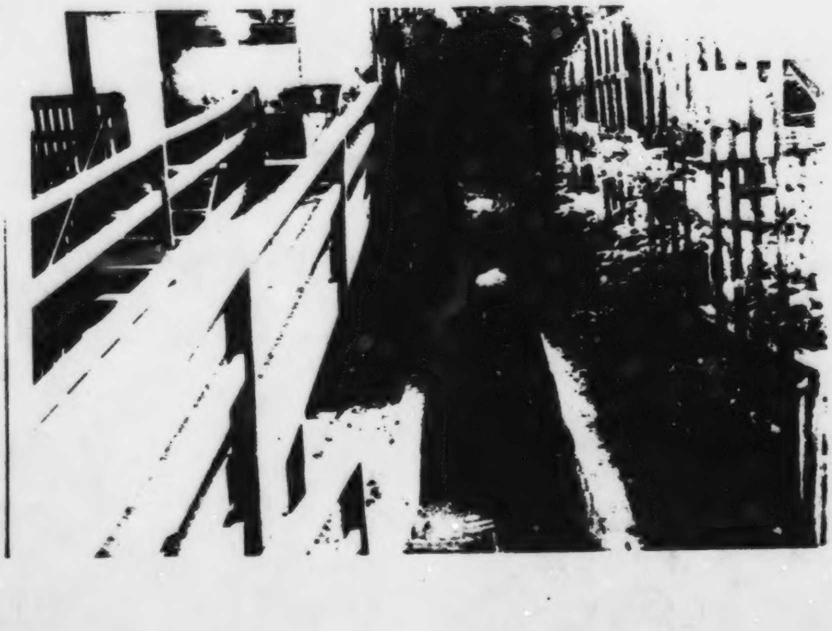

2
2
2
3
4
STOR.
REC. ROOM
5
2
1
UTILITY ROOM
1
PORCH ABOVE
UP
UP
UP

1. Bathroom renovated to include wheelchair shower
2. New bedrooms with intercom system
3. New vertical hoist and shaft installed
4. Interior stairs removed
5. Furnace room

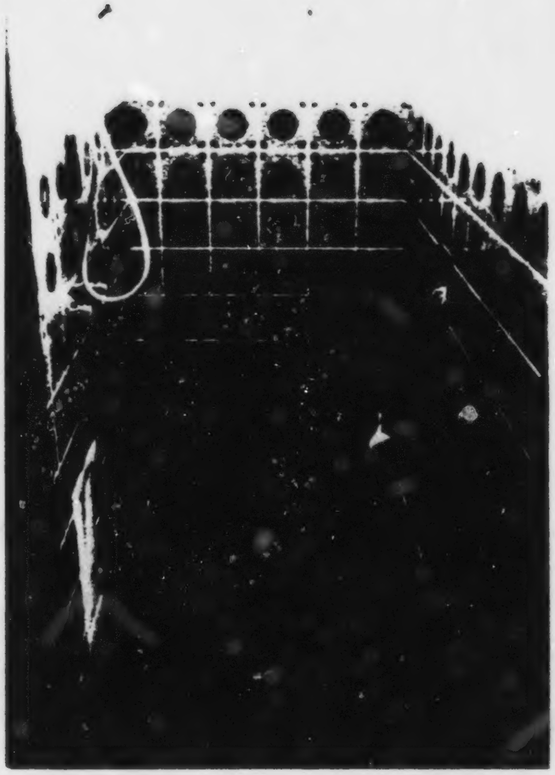
CASE STUDY NO. 8 - PHOTOGRAPHS



Wooden ramp and
handrails added
to back deck with
grade level rear
entry to basement.



CASE STUDY NO. 8 - PHOTOGRAPHS



Wheelchair shower with telephone shower head and low level controls.

CASE STUDY 9

9

REGION: West Coast

PROJECT: Apartment/Transitional Residence (3-storey)
Vancouver, British Columbia

MODULE 4: Purpose-built

DESCRIPTION OF USER

The user is a woman in her mid-thirties who has arthrogryposis; this is a congenital condition that allows her to have only minimal joint movement and reduced manual grip and dexterity. She is independent in all daily functions, except that her sister does most of her grocery shopping. She is a full-time student and receives a disability pension of about $400 a month, 25 per cent of which she pays for rent of her one-bedroom apartment. The wheelchair-adapted apartment has many features that make it easier for her to function. She has lived here for over two years.

DESCRIPTION OF HOUSING

The building is a 3-storey 45-unit subsidized apartment complex, specifically designed for physically disabled people. It was completed in November 1979 by the Greater Vancouver Housing Corporation, and contains a mix of 1-bedroom, 2-bedroom and 3-bedroom units, individuals, couples and families, and people with a variety of physical disabilities. Attendant care and homemaking services are available if required.

METHOD OF FINANCING

The owner (Greater Vancouver Housing Corporation) obtained financing for construction under the National Housing Act, Section 56.1.

DISABILITY-RELATED FEATURES

Exterior

Covered parking for the disabled, a low intercom at the front entrance and an automatic front door (slow closing) are provided.

Interior Public Areas

The building has wide corridors with handrails, two 3-storey interior ramps, an elevator with low call and cab buttoms, and an emergency generator.

Dwelling Unit

The apartment has wide doorways and hallways, no door sills, low locks and lever handles on doors, a low peephole and low light switches, heating controls and intercom, and raised electrical outlets. The front and bedroom closets have low rods and shelves, and sliding doors. There is a deep balcony, with no sill and a wide sliding door, and the upper part of the guard is clear plexiglass, providing excellent visibility.

The kitchen has a sink with knee clearance, a shallow offset drain, insulated pipes and a lever handle faucet. There are low counters and cupboards, a counter-top stove with knee clearance and front controls for the elements, fan and light, a front electrical outlet, side-hinged wall oven (high controls with adaptors) and a storage unit with low shelves and a sliding door.

The bathroom is large and has a bathtub with grab bars, two heights of soap dishes, a low hand shower and a lever handle faucet. The washbasin is low with knee clearance, lever handle faucets, and a low mirror. There is a heat lamp in the ceiling and plywood backing on all walls to which grab bars can be fixed.

An emergency call system was installed but has been disconnected; staff to provide 24-hour monitoring are not available.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

Only small additional expense has resulted in a physical environment that allows wheelchair mobility and better functioning of physically disabled users. The user noted only minor problems with design features. She has trouble with the kitchen drawers that open with lip pull handles, some kitchen cupboards are too high, and the opening and closing mechanisms on the windows and sliding doors are hard for her to use.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The construction appears to meet the requirements of Part 10 of the British Columbia Building Code.

ADMINISTRATION/CONSTRUCTION

Construction was by a general contractor for a fixed sum contract.

COMMENTS

Although this user is ambulatory, the nature of her disability is such that many aspects of the wheelchair-adapted apartment are of benefit to her. In general, she requires things to be at a lower level than does a wheelchair user.

The plywood backing on the bathroom walls is an excellent solution to the problem of providing grab bars appropriate for a particular user. This solution allows bars to be fixed in any location after the occupant moves in and his/her needs are known.

The issue of integration/segregation has been raised for this particular project. It is felt that, although it has worked fairly well, an integrated apartment house would be preferable. A second issue relates to the provision of housing versus care. It has been decided that Kelly Court is to provide only the former; this resulted in the decision to disconnect the emergency call system.

Overall, this is an excellent example of good design for disabled persons.

Existing Information

The total construction cost was $1.4 million, which is approximately $2.1 million in mid-1982 dollars. In addition, the contractor was able to provide a cost breakdown for items he considered disability-related, as follows.

($1979)

Item	Per Unit$	Total $(45 units)
Wheelchair ramps (3x cost of stairs)	$ 1 400	$ 63 000
Millwork, cabinets	150	6 750
Guardrails to suites	50	2 250
Guardrails to hallways	196	8 820
Hardware	25	1 125
Bathrooms - grab bars vanity, plywood backing	200	9 000
Wheelchair showers (in some units)	100	4 500
Kitchen (ranges, cooktops, hood controls, special plugs)	475	21 375
Emergency control (now disconnected)	155	7 000
Emergency generator for elevator	311	14 000
TOTAL	$3 062	$137 820

These represent 9.8 per cent of the total cost for disability-related features, excluding the elevator and additional area.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of disability- related features: $9 495 per unit. This includes some items not included by the contractor in Existing Information above (covered parking, elevator, extra area).

See table 1 for detailed cost estimates.

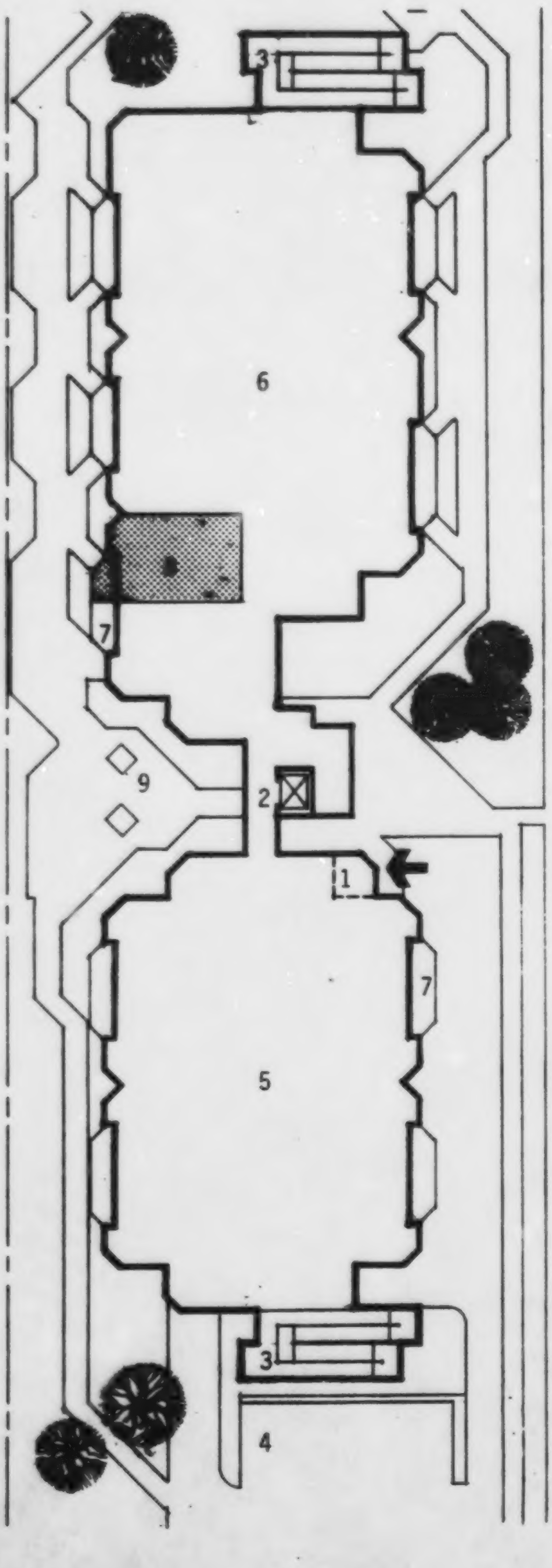
Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Construction

Exterior	Per Unit	Total	Interior Public Areas	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways	N/A	N/A	Additional area	N/A	N/A	Additional area[8]	2 500	
Parking[1]	2 600	115 000	Circulation			Circulation		
Entrance			General	N/A	N/A	General	N/A	
Steps	N/A	N/A	Corridors[3]	310	14 000	Hall	N/A	
Ramps	N/A	N/A	Common areas			Living	N/A	
Doors[2]	110	5 000	Lounges	N/A	N/A	Kitchen[9]	300	
Paving	N/A	N/A	Laundry	N/A	N/A	Bedroom	N/A	
Other			Elevating systems			Bathroom[10]	600	
Hand-rails	N/A	N/A	Elevators[4]	1 555	70 000	Service areas		
			Ramps[5]	975	44 000	Utility	N/A	
			Stairs	N/A	N/A	Storage[11]	NC	
			Specialties			Other areas[12]	NC	
			Equipment	N/A	N/A	Specialties		
			Services	N/A	N/A	Equipment	N/A	
			Systems[6]	280	12 500	Services[13]	30	
			Other			Systems[14]	100	
			Handrails[7]	135	6 000	Other		
			Corner guards	N/A	N/A	Corner guards	N/A	
	2 710			3 255			3 530	

Note: The numbered items were considered as potentially contributing to additional cost. Cost estimates are based on special features being incorporated in the original construction.

1. Includes all construction in the area of the parking, from the top surface of the second floor down to but excluding the slab on grade.
2. Includes an automatic sliding door and roll down fire door with credit for a standard single glass swinging door.
3. The corridor width exceeds a standard 1 730 mm by 1 100 mm.
4. Includes a certified elevator, with low cab/call buttons and slow closing doors, shaft, equipment room, emergency generator and lobby space at three levels.
5. Includes all construction beyond the outside walls of the end units, with credit of $45 000 for two standard exit stairs.
6. Includes a low intercom at the front door (NC) and an emergency call system.
7. Includes approximately 225 metres of wall rail in corridors.
8. Apartments 213 and 313 exceed a basic gross area of 48 square metres by 14 square metres.

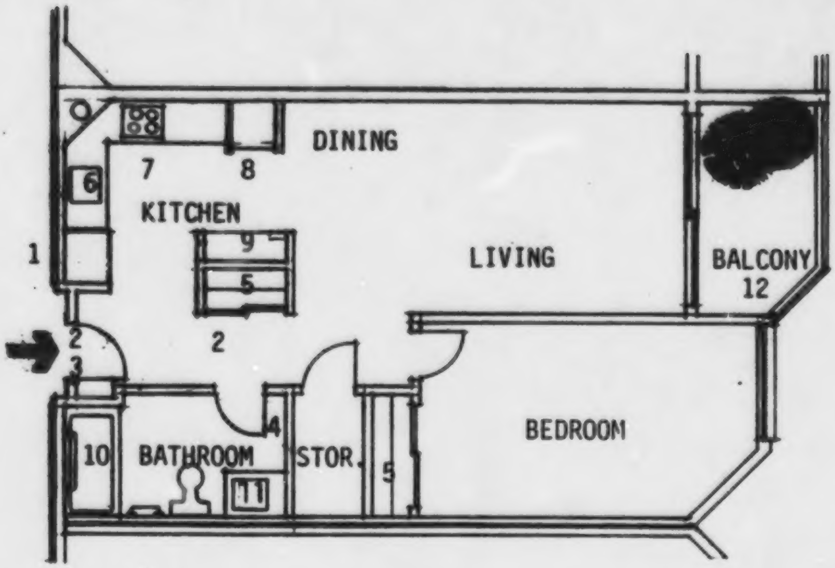
9. Includes a sink with knee clearance, insulated drain and lever handle faucet, lowered wall cabinets, lowered base cabinets (NC) counter top stove with front controls (NC), side hinged wall oven and pantry unit with sliding door (NC).
10. Includes four grab bars, a second soap dish, telephone shower (NC) and lever faucet at the bath, knee clearance below the wash basin (NC), an insulated drain and lever handle faucets, a low mirror (NC), a heat lamp and plywood backing on all walls.
11. Includes low rod and shelves (NC) and sliding doors (NC) at the hall and bedroom closets.
12. Includes a deep balcony (NC) with a wide sliding sill-less door (NC) and a clear plexiglass guardrail.
13. Includes eight raised electrical outlets and five lowered switches.
14. Includes two widened doors and four lever handles, no sills at doors (NC), low peephole (NC), lowered intercom and heating control (NC) low windows (NC).



CASE STUDY NO. 9

SITE PLAN

1. Main Entrance; automatic front door with intercom.
2. Elevator.
3. Ramps to Exits.
4. Outdoor parking area.
5. Undercover handicapped parking at ground level. Apartments on second and third levels.
6. Apartments on first, second and third levels.
7. Typical balcony.
8. Typical apartment.
9. Outdoor patio and barbeque.


DINING
7
8
6
KITCHEN
9
5
1
LIVING
BALCONY
12
2
2
3
4
10
BATHROOM
11
STOR.
5
BEDROOM

CASE STUDY NO. 9

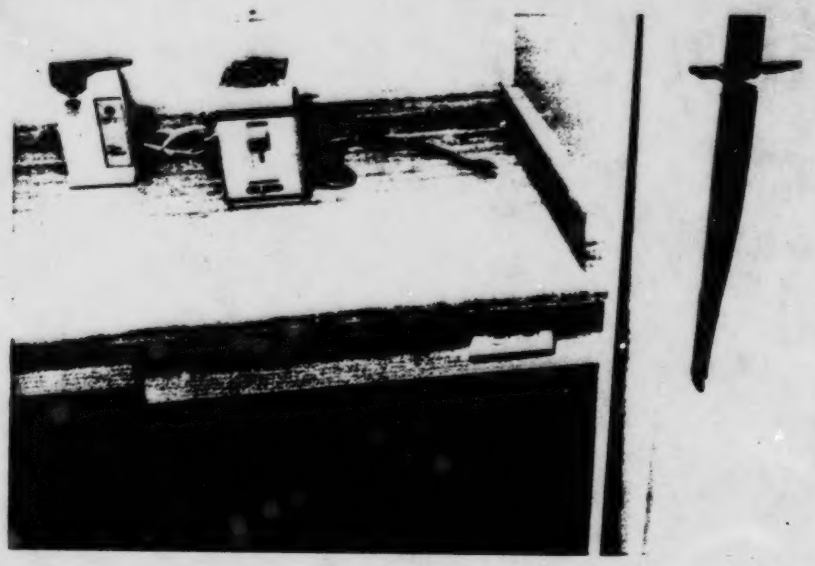
APARTMENT PLAN

1. Wide corridors with handrails
2. Wide doorways and hallways
3. No door sills at doorways
4. Lever handles on doors
5. Closets have low rods, shelves and sliding doors
6. Kitchen sink has knee clearance under, with insulated pipes; sink has lever handle faucets.
7. Countertop stove with knee clearance and front controls
8. Side-hinged wall oven
9. Kitchen storage unit with low shelves and sliding door
10. Bath has grab bars, low height shower and two soap dishes placed at different heights. Heat lamp aids drying after bathing.
11. Vanity with knee clearance and low mirror
12. Upper portion of balcony guard is clear plexiglass for improved visibility.

CASE STUDY NO. 9 - PHOTOGRAPHS

Deep balconies with clear plexiglass upper guard providing excellent visibility for a wheelchair user.

CASE STUDY NO. 9 - PHOTOGRAPHS

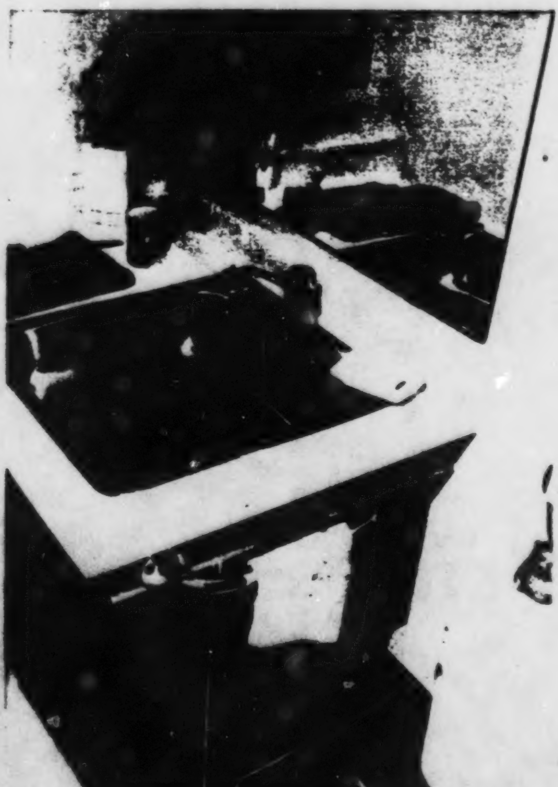


Low counters with knee clearance and front duplex eletrical outlet.

Shallow sink with offset drain and single lever handle faucet.

CASE STUDY NO. 9 - PHOTOGRAPHS

Toilet and bathtub grab bars and low telephone hand shower.



Shallow wash basin with knee clearance and lever handle faucet.

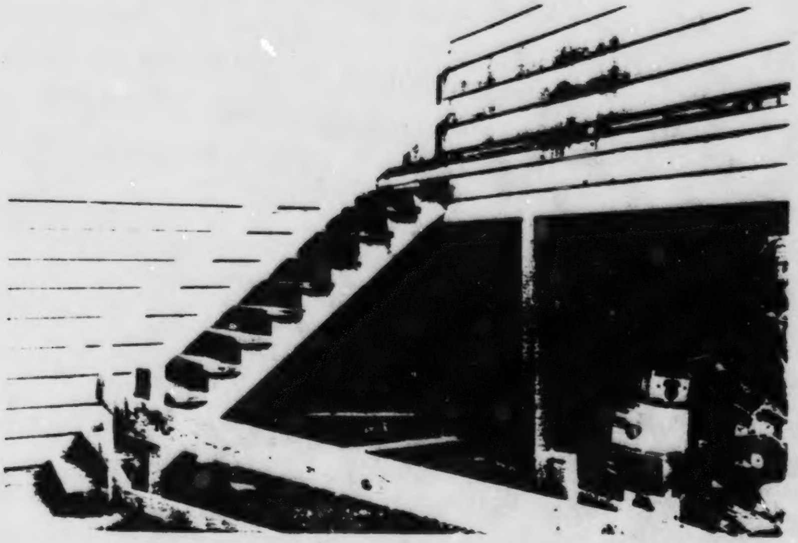
CASE STUDY 10

10

REGION: West Coast

PROJECT: Group Home (single-storey)
Vancouver, British Columbia

MODULE 1: Conversion - RRAP and National Housing Act (Section 56.1) Funding



DESCRIPTION OF USER

The user is a twenty-seven year-old man confined to a wheelchair following an accident in 1975 which left him a C-6,7 quadraplegic. He is able to get into bed himself but requires assistance for all other transfers and personal care. There is a live-in 24-hour attendant/homemaker in the home and the user also hires a male attendant to come in every three days. He owns a wheelchair van with a hydraulic lift so is able to go out independently. He receives Workmen's Compensation of about $700 a month, of which he pays about 25 per cent for rent. He has been able to find only some short-term work since his accident. There were three other disabled occupants in this dwelling -- one has multiple sclerosis, one is a paraplegic and one is blind.

DESCRIPTION OF HOUSING

The house is a five-bedroom detached single-storey woodframe and stucco dwelling with a stepped front entry, a rear entry from the main floor deck and a grade-level basement rear entry. It was purchased by a non-profit community organization that serves the disabled and was renovated for wheelchair accessibility in 1978. The main floor is open and spacious and permits good wheelchair mobility. Movement is somewhat restricted in the basement area. There are three main-floor bedrooms and two in the basement. The user's bedroom is in the basement; there is also a bathroom with a wheelchair shower in the basement that he alone uses.

METHOD OF FINANCING

The purchase and renovations were financed by a combination of RRAP and National Housing Act (Section 56.1) financing.

DISABILITY-RELATED FEATURES

Exterior

An exterior vertical hoist was added at the back deck area, with a plywood ramp and handrail at ground level to the driveway. The concrete sidewalk at the side of the house was widened and extended to meet the front sidewalk. A sloped concrete sidewalk was added from the parking pad to the existing sidewalk.

Interior Public Areas

Not applicable.

Dwelling Unit

About one metre of wall was removed at the head of the stairs to provide better wheelchair access to the bedroom. The bathroom doorway was widened to 760 mm and the kitchen door was changed to swing outward. Rough-in for washer and dryer was installed in the kitchen.

The downstairs bathroom was renovated to include a recessed wheelchair shower area, telephone shower and ceiling heat lamp. The washbasin and vanity were reinstalled to provide knee clearance, a lever faucet, hand sprayer and low mirror. A grab bar was installed beside the toilet. The door sill was lowered and a bevelled edge added.

The closet bifold door in the user's basement bedroom was replaced with a drapery track.

Other general work included enclosing the furnace, installing hot air ducts, repairing the upstairs bathtub, cleaning drains, repairing the back deck, and painting. Some electrical work was also done and smoke detectors and fire stops were installed.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

Wheelchair mobility is poor in the basement area and this is exacerbated by the carpeting in some areas. The kitchen is not adapted for wheelchair users but this does not seem to be a problem for this particular user as he cannot prepare meals himself. Space is rather limited in the user's basement bedroom and he has difficulty going through the doorway. He finds the bathroom and wheelchair shower satisfactory. Although the renovations are not ideal, and do not provide total wheelchair accessibility, the accessibility and usability of the house has been greatly improved for very little cost.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The exterior vertical hoist does not appear to meet code requirements and there is concern about its safety. Requirements for doorway/hallway widths and approaches are not met in some areas of the basement, resulting in the difficulties noted under Functional Adequacy above.

ADMINISTRATION/CONSTRUCTION

Construction was by a general contractor and was completed within approximately four months following purchase of the house.

COMMENTS

The case study is an example of providing low cost converted housing for a group of disabled persons. Although the renovations are not ideal, they have made the house liveable and usable for wheelchair disabled persons.

Existing Information

The total loan for purchase and renovations in 1978 was approximately $96 000. The house was purchased for $86 000, and $10 000 was spent on renovations; $2 500 of this was forgivable RRAP loan.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated cost	
Disability-related features	$11 720
Code requirements	$ 1 200
Gneral repairs/renovations	$ 6 300
Total	$19 220

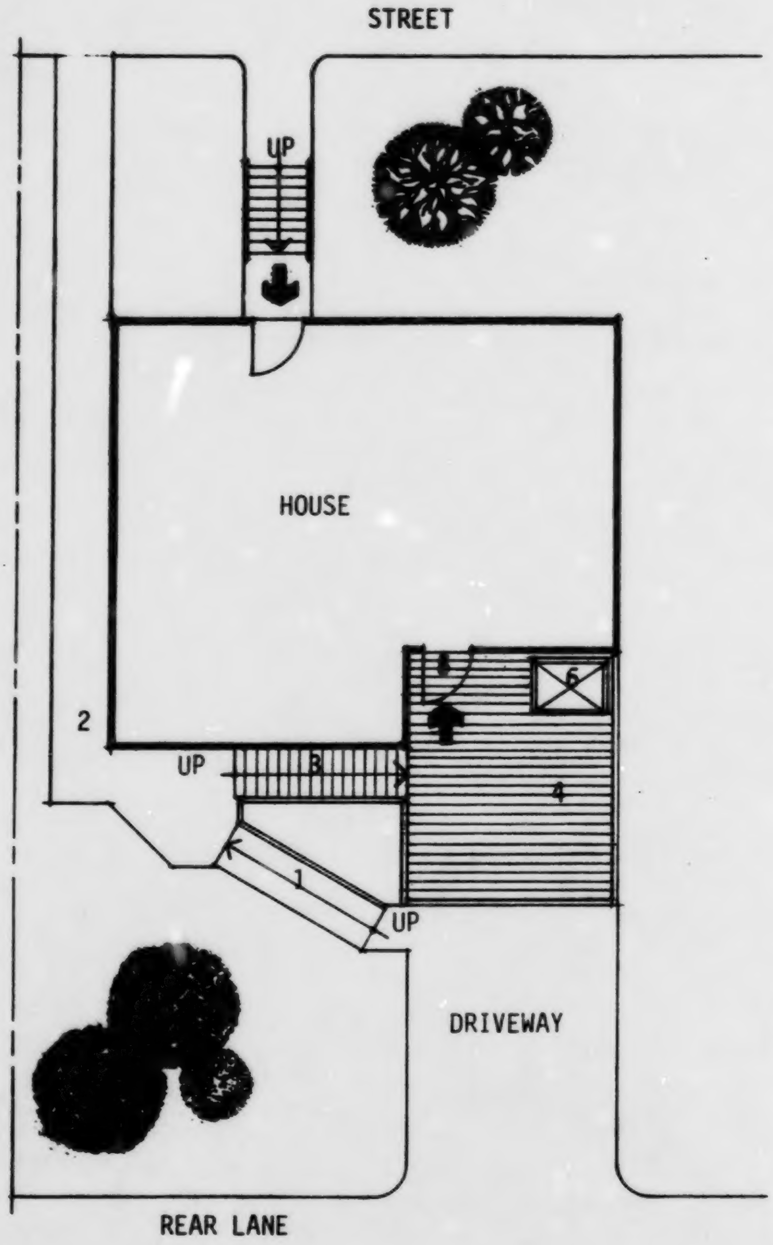
See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways[1]		600	Additional area			Additional area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall[4]		500
Ramps[2]		800	Common areas			Living		N/A
Doors[3]		150	Lounges			Kitchen		N/A
Paving		N/A	Laundry			Bedroom[5]		300
Other			Elevating systems			Bathroom[6]		2 870
Hand- rails		N/A	Elevators			Service areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Laundry[7]		500
			Equipment			Other areas		N/A
			Services			Specialties		
			Systems			Equipment		N/A
			Other			Services		N/A
			Handrails			Systems[8]		6 000
			Corner guards			Other		
						Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		1 550						10 170

Note: The numbered items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility.

1. Includes widening an existing sidewalk and extending it to the street, and relocating a gas meter and rain water down spout.
2. Includes removing an existing concrete sidewalk and installing a wood ramp and handrails.
3. Includes changing the swing of the kitchen door.
4. Includes removing a wall at the second floor.
5. Includes removing a closet bifold door and partition wall, reframing and installing a drapery track.
6. Includes widening the second floor door and dropping the basement sill; creating a wheelchair shower with telephone head, vanity with knee clearance, lever faucet, hand sprayer, low mirror.
7. Includes plumbing and electrical connections for laundry equipment. Equipment by others.
8. Includes a vertical hoist; the provision of an elevator or a hoist with improved safety features would substantially increase cost.


STREET
UP
HOUSE
2
UP
3
4
5
6
1
UP
DRIVEWAY
REAR LANE

CASE STUDY NO. 10

SITE PLAN

1. Sloped concrete ramp up to sidewalk.
2. Sidewalk widened by two feet.
3. Stairs up to deck.
4. Deck over carport below.
5. Entrance to upper level of house. Entrance to lower level is directly below, through carport.
6. Outdoor vertical hoist connecting upper and lower levels.

CASE STUDY NO. 10 - PHOTOGRAPHS

Vertical hoist from grade level to back deck entrance.

Wheelchair shower witn telephone hand shower and low control faucets.

CASE STUDIES
QUEBEC REGION
(Montreal, P.Q.)

CASE STUDY 11
Apartment
Module 2: Conversion

CASE STUDY 12
Row Housing
Module 1: Conversion

CASE STUDY 13
Apartment
Module 3: Purpose-built - Upgrading Recommended

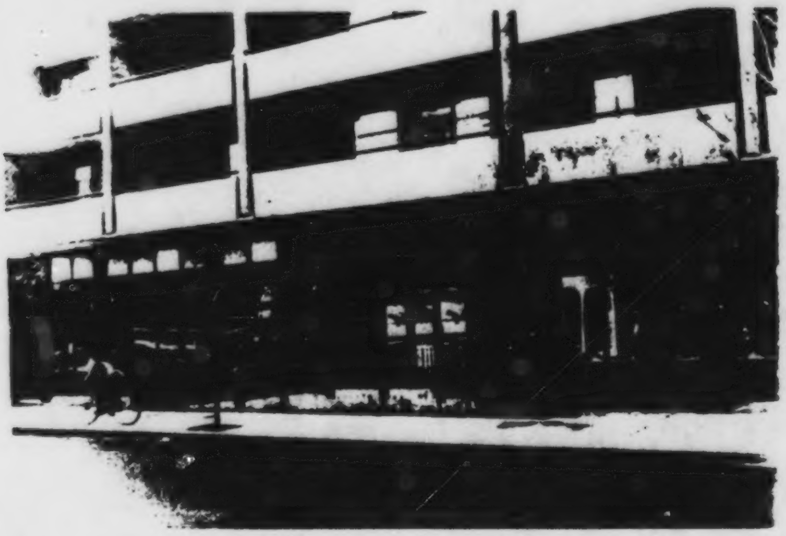
CASE STUDY 11

11

REGION: Quebec

PROJECT: Apartment Building (12-storey)
Montreal, P.Q.

MODULE 2: Conversion - Lucie Bruneau Foundation Funding



DESCRIPTION OF HOUSING
The user is a twenty-four-year-old man confined to a wheelchair because of muscular dystrophy. He receives about one and a half hours a day of attendant and homemaker care. He requires assistance in all transfers, personal care and homemaking, but is able to do some meal preparation and shopping independently. He has been living here for over two years, and receives a disability pension of approximately $5 000 a year of which he pays 25 per cent for accommodation. He lives alone and is a student at a local community college.

DESCRIPTION OF HOUSING

The residence is a unit in a 12-storey, 100-unit apartment building completed in 1978. Twelve of the units were renovated for wheelchair users in 1979. In addition, some changes were made to the main entrance. There was an existing concrete ramp at the main entrance.

METHOD OF FINANCING

The Lucie Bruneau Foundation and Société d'habitation du Québec financed the renovations to the 12 units and the main entrance.

DISABILITY-RELATED FEATURES

Exterior

A concrete ramp, landing and handrail at the main entrance was part of the original construction. The two main doors were replaced by doors with stainless steel wheelchair guards and low door pushes. The exterior door is a two-way swing door. A low pushbutton combination lock entry system was added at the interior door.

Interior Public Areas

Standard.

Dwelling Unit

A bevelled edge was added to the door sill into the apartment and the intercom buttons (but not the speaker) were lowered. The hall closet doors were replaced by sliding doors and low shelves were added. The door to the linen closet was removed, and low shelves added. Chain pulls were added to all light switches. The balcony was raised and a portable ramp supplied to access it.

The kitchen floor was raised approximately 150 mm and ramped at both doorways. The cabinets under the sink were removed and the pipes insulated. Lever handle faucets were added to the sink and a chain pull to the hood controls of the stove. The handles on the lower drawers and cupboards were replaced by larger ones.

The door to the bathroom was replaced by a sliding door. The cupboards beneath the sink were removed, and lever handle faucets added to the washbasin and bathtub. A telephone shower was installed in the bath and a diagonal grab bar added beside the toilet. The user has made a shower chair by removing one arm of a lawn chair.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

A number of problems were noted. The main lobby intercom and elevator buttons are too high. In the apartment unit, the intercom speaker is too high, the electrical outlets are too low, and the window latches are too high and difficult to operate. Wheelchair manoeuvrability in the kitchen is somewhat difficult. The user cannot install the portable ramp himself to gain access the balcony yet has been instructed to go out onto the balcony in the event of fire. However, the user is generally satisfied with his apartment.

Notwithstanding the above problems, this case study is a cost-effective example of improving the accessibility and usability of an apartment for a disabled occupant.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

Much of the work does not meet suggested guidelines or standards. For instance, the raised balcony results in a guard rail lower than code requirements, the ramps into the kitchen are quite steep, and other problems indicated in Functional Adequacy above result from work not corresponding to available design guidelines. Most problems are due to the nature of the work done, that is, minimal renovations to an existing apartment unit. This does not detract from the overall usefulness of the renovations to the disabled occupant.

ADMINISTRATION/CONSTRUCTION

Permission of the owner was required before renovatins could be made. The renovations were carried out by the Lucie Bruneau Foundation.

COMMENTS

This case study is a unique example of renovating an apartment at minimal cost and, although renovations are not ideal, they improve the accessibility and usability for the disabled occupant.

Existing Information on Costs

It was estimated (in 1979 dollars) that about $800 a unit was spent on renovations. In addition, approximately $10 000 was spent on replacing the main doors and adding the combination lock entry system.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of renovations: $2 350 per unit.

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building

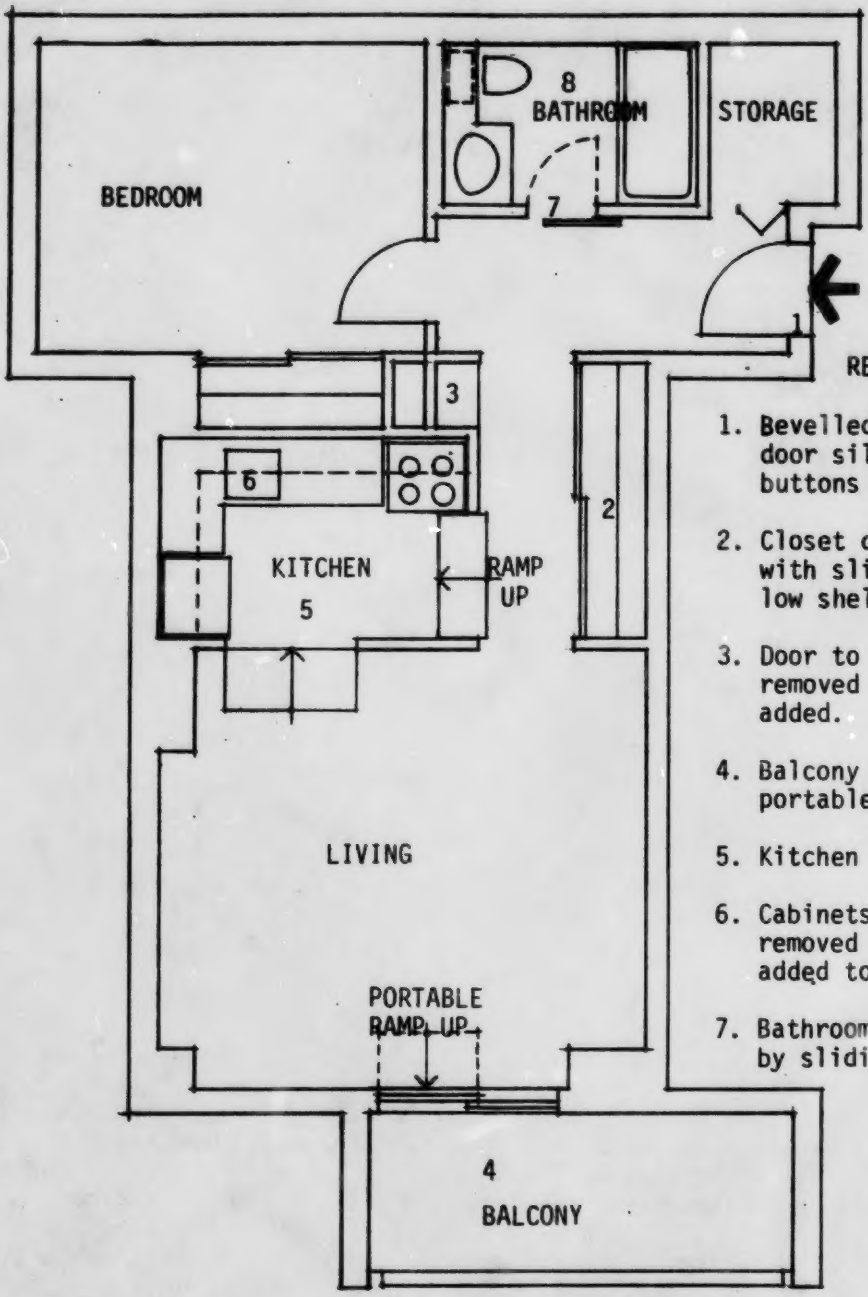
Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways	N/A	N/A	Additional area			Additional area	N/A	
Parking	N/A	N/A	Circulation			Circulation		
Entrance			General			General	N/A	
Steps	N/A	N/A	Corridors			Hall[2]	100	
Ramps	N/A	N/A	Common areas			Living	N/A	
Doors[1]	710	8 500	Lounges			Kitchen[3]	555	
Paving	N/A	N/A	Laundry			Bedroom	N/A	
Other			Elevating systems			Bathroom[4]	390	
Hand- rails	N/A	N/A	Elevators			Service areas		
			Ramps			Utility	N/A	
			Stairs			Storage[5]	200	
			Specialties			Other areas	N/A	
			Equipment			Specialties		
			Services			Equipment	N/A	
			Systems			Services[6]	125	
			Other			Systems	N/A	
			Handrails			Other		
			Corner guards			Corner guards	N/A	
						Balcony sill ramp[7]	50	
						Balcony elevating ramp[8]	220	
	710						1 640	

Note: The numbered items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility except in the case of the ramp, which was done at the time of construction.

1. Includes one double acting door with kickplate, low push plates and push button door lock release.
2. Includes a bevelled door sill.
3. Includes a raised floor with ramps at each door, knee clearance under the sink, insulated pipes, lever handle faucets, chain pull on stove hood and large handles on the drawers and cupboards.
4. Includes a sliding door, knee clearance below the sink, lever faucets at the washbasin and bathtub, telephone shower head and grab bar at the toilet.
5. Includes sliding closet doors and low shelves at the hall and linen closet and removal of door to linen closet.
6. Includes chain pulls on five light switches and three intercom buttons lowered.
7. Includes a portable ramp to enter the balcony.
8. Includes a wood platform on the balcony.

CASE STUDY NO.11

APARTMENT PLAN


8
BATHROOM
STORAGE
BEDROOM
7
1
3
6
2
KITCHEN
5
RAMP
UP
LIVING
PORTABLE
RAMP UP
4
BALCONY

RENOVATIONS INCLUDE:

1. Bevelled edge added to door sill. Intercom buttons lowered.
2. Closet doors replaced with sliding doors and low shelves added.
3. Door to linen closet removed and low shelves added.
4. Balcony raised with portable ramp for access.
5. Kitchen floor raised 150 mm.
6. Cabinets under sink removed and lever handles added to sink.
7. Bathroom door replaced by sliding door.
8. Changes to bathroom include a telephone shower installed in bath, a grab bar added beside the toilet, the cupboards beneath the vanity removed and lever faucets added to the wash basin and bathtub.

CASE STUDY NO. 11 - PHOTOGRAPHS

Main entrance with two-way swing door, low door pushes and stainless steel wheelchair guard.

Raised kitchen floor with ramped entry. Cabinets under sink removed to permit knee clearance, and pipes insulated. Lever handle faucet added.

CASE STUDY 12

12

REGION: Quebec

PROJECT: Row Housing (2-storey)
Montreal, P.Q.

MODULE 1: Conversion - RRAP, National Housing Act (Section 56.1) and Municipal Funding

DESCRIPTION OF USER

The user is in his late sixties and has been confined to a wheelchair for the past four years following amputation of both lower limbs. He is able to make all transfers and carries out personal care independently; a relative helps him with shopping and homemaking. Now retired, he receives a pension of approximately $6 000 a year. He has been living here for about four months and pays about $100 a month for rent.

DESCRIPTION OF DWELLING

This is a cooperative housing project of 21 units, of which 4 are housing for disabled persons. It is a series of row housing built in the early 1900s and renovated in 1981. The unit visited is a rooming house arrangement on the first floor consisting of four individual rooms, each equipped with a kitchen unit, two shared adapted bathrooms and a common kitchen, laundry and living room facilities. There are stepped and elevator entrances at the front, and a side ramp to a back deck entry.

METHOD OF FINANCING

Financing was through a combination of RRAP ($59 000), City of Montreal ($39 000) and National Housing Act (Section 56.1) financing.

DISABILITY-RELATED FEATURES

Exterior

A wooden deck was added at the back entrance. A wooden ramp and handrails extend from the deck, along the side of the building, to a concrete sidewalk, which joins the existing front sidewalk. The exterior elevator door has a small concrete ramp to the sidewalk.

Interior Public Areas

Not applicable.

Dwelling Unit

An elevator was added at the front entrance from street level to the first floor. It has low call and cab buttons and the doors have low handles. The elevator opens into an enclosed front porch. There is a shared standard kitchen, laundry facilities and a living/sitting room.

Two large shared adapted bathrooms permit good wheelchair mobility. Each includes a washbasin with knee clearance and handle lever faucets, two grab bars by the toilet and two in the bathtub, a telephone type shower and lever handle faucets in the bathtub, a shower seat and a low light switch and heating controls. Smoke detectors and a fire alarm system were also added.

Each of the four rooms has a recessed kitchenette unit with a stove with front controls and a front electrical outlet. There is a second reachable electrical outlet at counter height on the side wall of the kitchenette unit. The front closet has a bifold door and low rod and shelf. The storage cupboard has a bifold door and low shelves. The intercom, light switch and heating controls are low.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The functional adequacy overall is good. The shared bathrooms are well designed but the user would prefer not having to share bathroom facilities. The kitchenette units in the rooms, however, are not particularly good for a wheelchair user as there is no knee clearance under the sink or counter. This is less a problem for this particular user because, due to his amputation, there are no foot rests on his wheelchair, which means that he can get quite close to the sink and faucets. However, he does find the upper cupboards rather high. Both overall space and storage space are limited in the room itself. The common areas are not, apparently, used much by the occupants. This may be due to the fact that the kitchen and laundry facilities are standard, that is, not adapted for wheelchair users. Wheelchair mobility in the front porch elevator area is limited.

In general, this a cost-effective example of renovating and upgrading older housing for disabled occupants.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

Most work meets code requirements (for example, a 1:12 ramp, with recommended handrails and landing) and bathrooms are designed according to recognized standards. See Functional Adequacy above for problems arising from items that do not meet suggested requirements for housing for disabled persons.

ADMINISTRATION/CONSTRUCTION

The work was carried out by a general contractor.

COMMENTS

This case study represents an example of renovating older housing into a rooming house/group home setting for disabled persons. Some problems were indicated in that the occupants find themselves rather isolated and lonely. It was thought that prescreening users as a group and having the unit function more like a group home might improve this situation. The rooms do not seem to be popular as most tenants would prefer to have a self-contained apartment and more space.

Existing Information

The total loan for the 21 units was $409 938. The architect provided estimates of some disability features of the four units.

The elevator cost approximately $28 000. The ramp cost $1 200. The cost of renovating each of the four rooms is estimated at $8 900, $1 200 of which was for the kitchenette unit. Special hardware cost approximately $250 per room, the increased size of the bathroom $200 per room, and the special bathroom washbasin about $75 more per room.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of cost estimates		
Disability-features		$31 170
Code requirements		$ 5 000
General repairs/renovations		$15 000
	Total	$51 170

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Conversion of an Existing Building

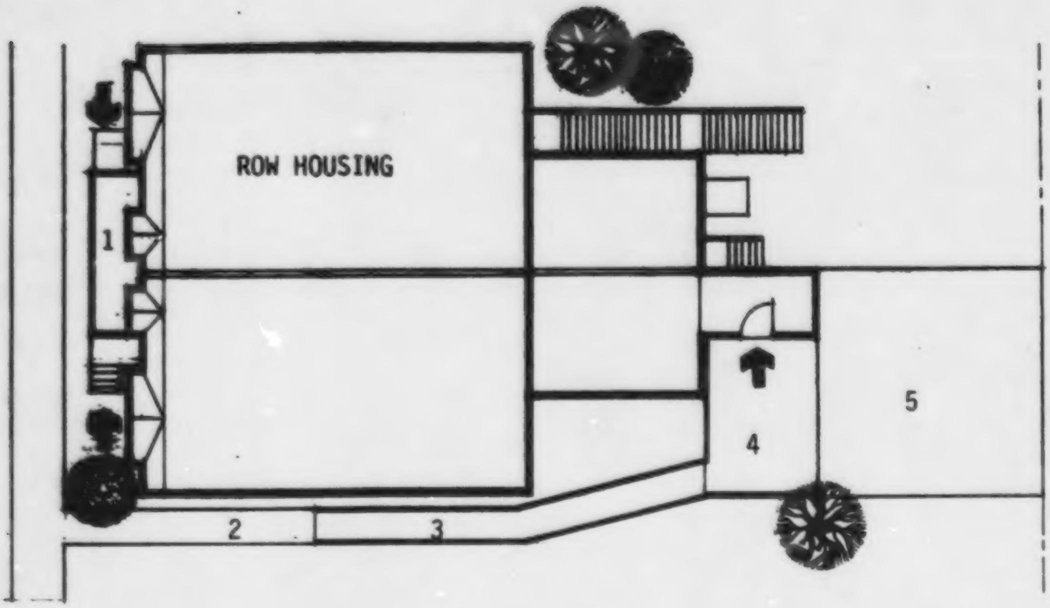
Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General		N/A
Steps[1]		N/A	Corridors			Hall		N/A
Ramps		2 400	Common areas			Living		N/A
Doors		N/A	Lounges			Kitchen		N/A
Paving		N/A	Laundry			Bedroom		N/A
Other			Elevating systems			Bathroom[2]		770
Hand-rails		N/A	Elevators			Service areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment		N/A
			Systems			Services		N/A
			Other			Systems[3]		28 000
			Handrails			Other		
			Corner guards			Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		2 400						28 770

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on converting an existing facility.

1. Includes a wood deck, ramp and handrails, and concrete slab to join the ramp to the city sidewalk.

2. Includes two washrooms with knee clearance below the washbasin, lever faucets at the washbasin and bathtub, four grab bars, telephone shower and low light switch and heating controls.

3. Includes an elevator with safety features not necessarily to the standards demanded by the appropriate authorities, and the total construction beyond the front of the building except the stairs.


ROW HOUSING
1
2
3
4
5

CASE STUDY NO. 12

SITE PLAN

1. Common enclosed front entrance porch

2. New concrete sidewalk

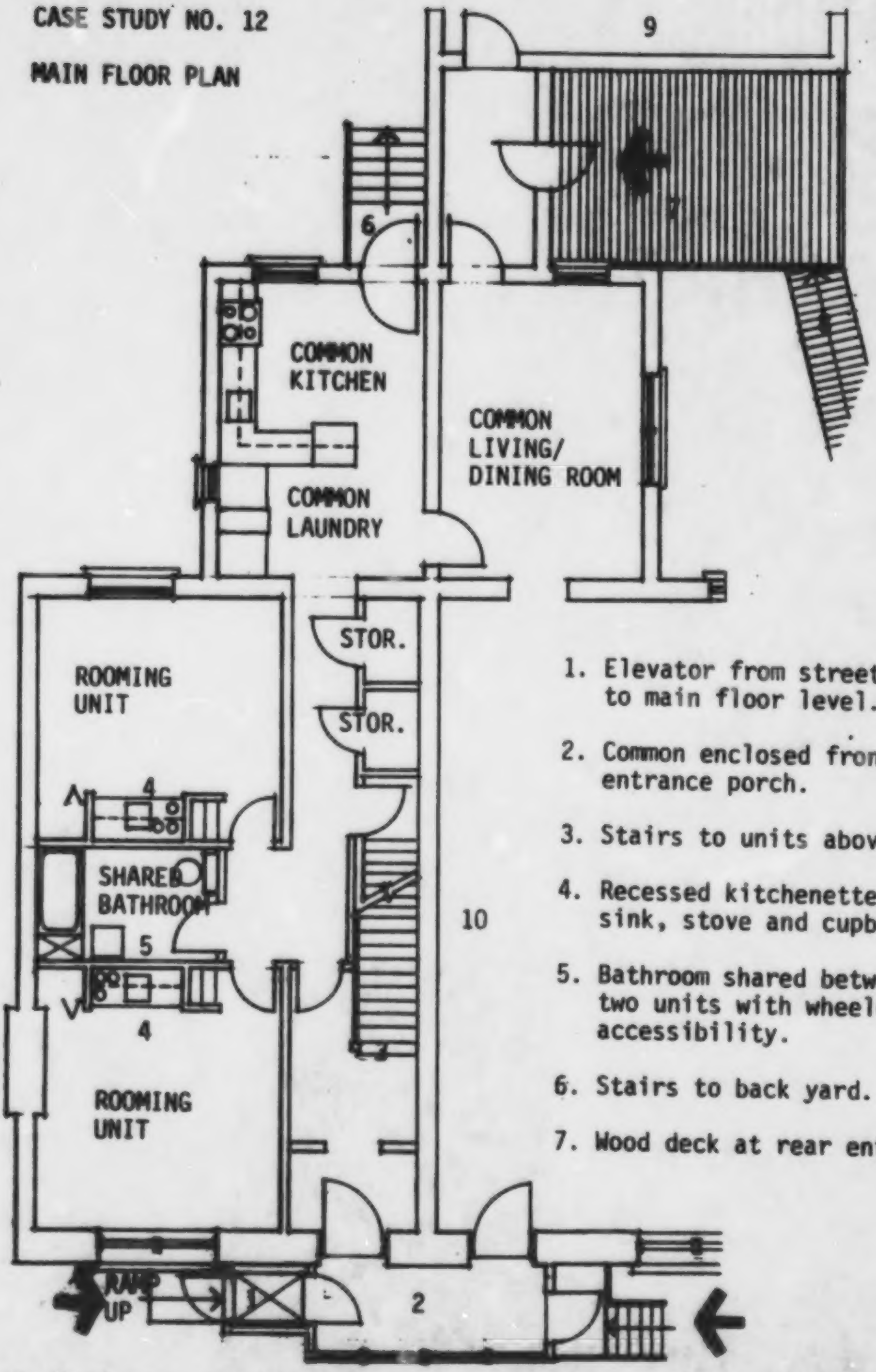
3. New ramp with handrails

4. New wooden deck off rear entrance

5. Garage

CASE STUDY NO. 12

MAIN FLOOR PLAN


9
6
7
COMMON KITCHEN
COMMON LIVING/ DINING ROOM
COMMON LAUNDRY
STOR.
STOR.
ROOMING UNIT
4
SHARED BATHROOM
5
4
ROOMING UNIT
10
RAMP UP
1
2

1. Elevator from street level to main floor level.
2. Common enclosed front entrance porch.
3. Stairs to units above.
4. Recessed kitchenette with sink, stove and cupboards.
5. Bathroom shared between two units with wheelchair accessibility.
6. Stairs to back yard.
7. Wood deck at rear entrance.
8. Wood ramp to walkway
9. Garage
10. Reverse plan shares common facilities

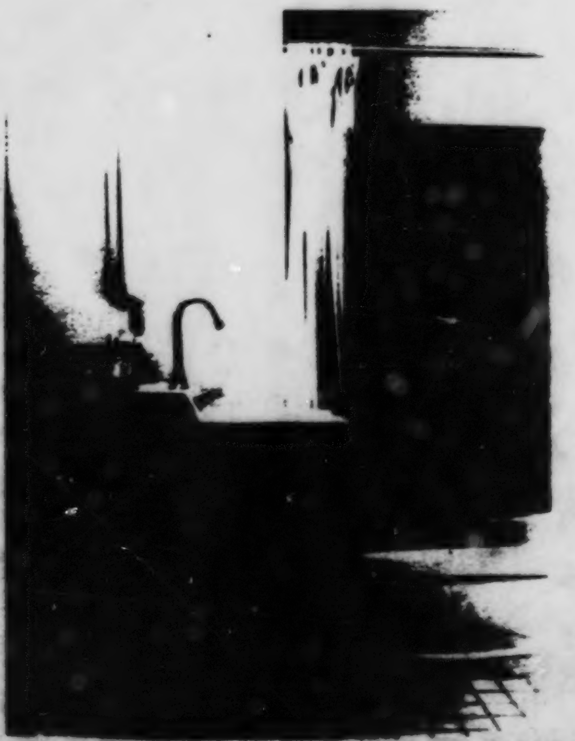
CASE STUDY NO. 12 - PHOTOGRAPHS

Street level door to elevator. Low door handle and call buttons and concrete ramped entry.

Side ramp and sidewalk to back deck entrance.

CASE STUDY NO. 12 - PHOTOGRAPHS

Bathroom grab bars, telephone shower and shower transfer seat.



Wash basin with knee clearance and faucet with goose neck spout and lever handles.

CASE STUDY 13

13

REGION: Quebec

PROJECT: Apartment (2-storey 4-plex)
Montreal, P.Q.

MODULE 3: Purpose-built - Upgrading Recommended

DESCRIPTION OF USER

The user is a fifty-seven-year-old man who has had both legs amputated as a result of injuries sustained in the war. He has been confined to a wheelchair for the past fifteen years, but remains independent with respect to transfers, personal care and eating. His wife does most of the meal preparation, laundry, cleaning and shopping. They pay approximately $35 a month for rent and have lived here for almost twenty years. He is not employed and receives a pension from the Department of Veterans Affairs. Their annual income is $15 000 to $18 000.

DESCRIPTION OF HOUSING

The project was built in the 1950s specifically to house disabled and non-disabled war veterans. It consists of 28 units contained in 2-storey 4-plexes. The ground floor apartments are for non-ambulatory persons.

METHOD OF FINANCING

The construction of this project was financed under the National Housing Act, Section 56.1.

DISABILITY-RELATED FEATURES

Exterior

There is a small wooden landing and ramp from the side door to the sloped driveway. The user has added a second wooden ramp, deck and handrails at the back.

Interior Public Areas

Not applicable.

Dwelling Unit

The design of the three-bedroom unit is such that the circulation and approach to doorways is reasonable, especially as this particular user has no footrests on his wheelchair. The bathroom has a toilet that has been raised on a concrete platform, a washbasin with knee clearance, and a thick metal bar above and parallel to the rim of the bathtub for its entire length to aid in bathtub and toilet transfers.

The user has added a low coat rack by the back door, a low shelf over the kitchen sink, and a clothing storage unit with a low rod and shelf in his bedroom.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

Some problems were noted. There is only one wheelchair-accessible entrance/exit at the side door. A landing, ramp and handrails should be provided at the front door to provide an alternative entrance/exit. The side ramp should have a handrail added and be upgraded to reduce the gradient. The descent from the driveway to the back is steep and potentially hazardous, and the user requires assistance to get to the deck. The slope should be reduced by regrading the driveway.

The user does not go into the back yard/garden as he cannot easily propel his wheelchair over the grass. A concrete walkway into and around the back yard should be added.

Neither the side nor the front vestibule is large enough to permit a complete turn in a wheelchair. The front vestibule should be enlarged in width and depth to measure 1 500 x 1 500 mm, and include a clothes cupboard.

The kitchen is not wheelchair accessible and the user would like to be more independent in meal preparation. The kitchen should be redone to allow wheelchair accessibility; lower counters and cupboards, knee clearance under the sink and some counter area, and accessible eating area, front stove controls and reachable electrical outlets should be provided.

The bathroom is too small and toilet and bathtub transfers with the bar provided are difficult and potentially hazardous. The bathroom should be enlarged, the door widened and the clothes cupboard relocated to the front vestibule. Fixtures should be relocated to provide room for transfers, and appropriate grab bars added. A shower seat and telephone-type shower should be added. The mirror and medicine cabinet should be relocated to be within reach of a wheelchair user.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The existing unit does not meet standards for designing for the disabled, probably because guidelines were not available at the time of construction.

ADMINISTRATION/CONSTRUCTION

No information is available.

COMMENTS

Although the design of these units presents many problems to the user, he has lived here for twenty years and has adapted to the environment by incorporating small changes into the unit. He has ideas of how to improve his home but is making no arrangements to upgrade it. This is a unique example of an older construction designed specifically for wheelchair users before any guidelines on appropriate design were available.

Existing Information

No information is available.

Cost Estimates (tables 1 and 2)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs	
Disability-related features	$ 1 050
Upgrading recommended	$10 400
Upgrading costs had the recommended features been incorporated at the time of construction	$ 3 500

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Construction and Conversion

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall		N/A
Ramps[1]		800	Common areas			Living		N/A
Doors		N/A	Lounges			Kitchen[2]		100
Paving		N/A	Laundry			Bedroom[3]		NC
Other			Elevating systems			Bathroom[4]		150
Hand-rails		N/A	Elevators			Service areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment[5]		N/A
			Systems			Services		N/A
			Other			Systems		N/A
			Handrails			Other		
			Corner guards			Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		800						250

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on renovations to an existing facility except the toilet platform and side ramp, which were done during construction.

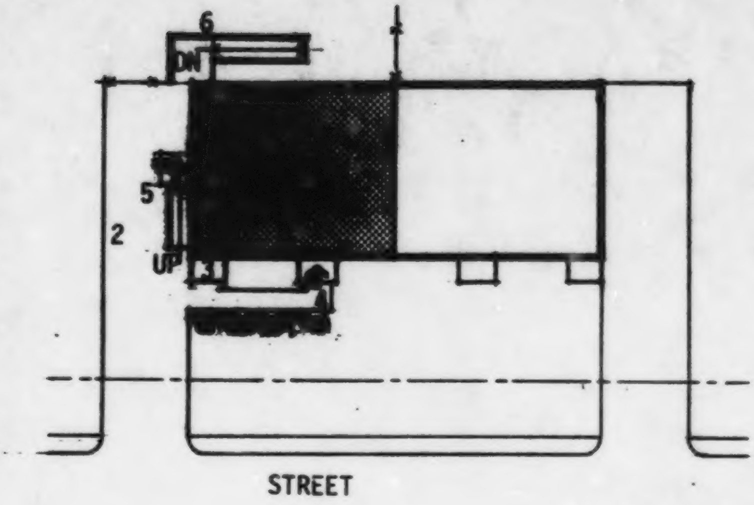
1. Includes two ramps and a deck and handrails.
2. Includes a low shelf over the kitchen sink.
3. Includes a clothes storage unit (NC) with low rod and shelf (NC).
4. Includes a concrete platform below the toilet, knee clearance below the washbasin (NC) and a grab bar over the bath tub.
5. Includes a low coat rack (NC).

Table 2 Cost Estimates of Recommended Upgrading

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/			Additional			Additional		
walkways		N/A	area			area	N/A	
Parking		N/A	Circulation			Circulation		
Entrance			General			General	N/A	
Steps		N/A	Corridors			Hall[3]	1 100	
Ramps[1]		1 800	Common areas			Living	N/A	
Doors		N/A	Lounges			Kitchen[4]	5 000	
Paving[2]		700	Laundry			Bedroom	N/A	
Other			Elevating			Bathroom[5]	1 800	
Hand-			systems			Service		
rails		N/A	Elevators			areas		
			Ramps			Utility	N/A	
			Stairs			Storage	N/A	
			Specialties			Other areas	N/A	
			Equipment			Specialties		
			Services			Equipment	N/A	
			Systems			Services	N/A	
			Other			Systems	N/A	
			Handrails			Other		
			Corner			Corner		
			guards			guards	N/A	
						Balcony		
						sill ramp	N/A	
						Balcony		
						elevating		
						ramp	N/A	
							10 400	

Note: The following items are considered necessary by the Consultants to upgrade this dwelling unit. Cost estimates are based on all items being done at one time.

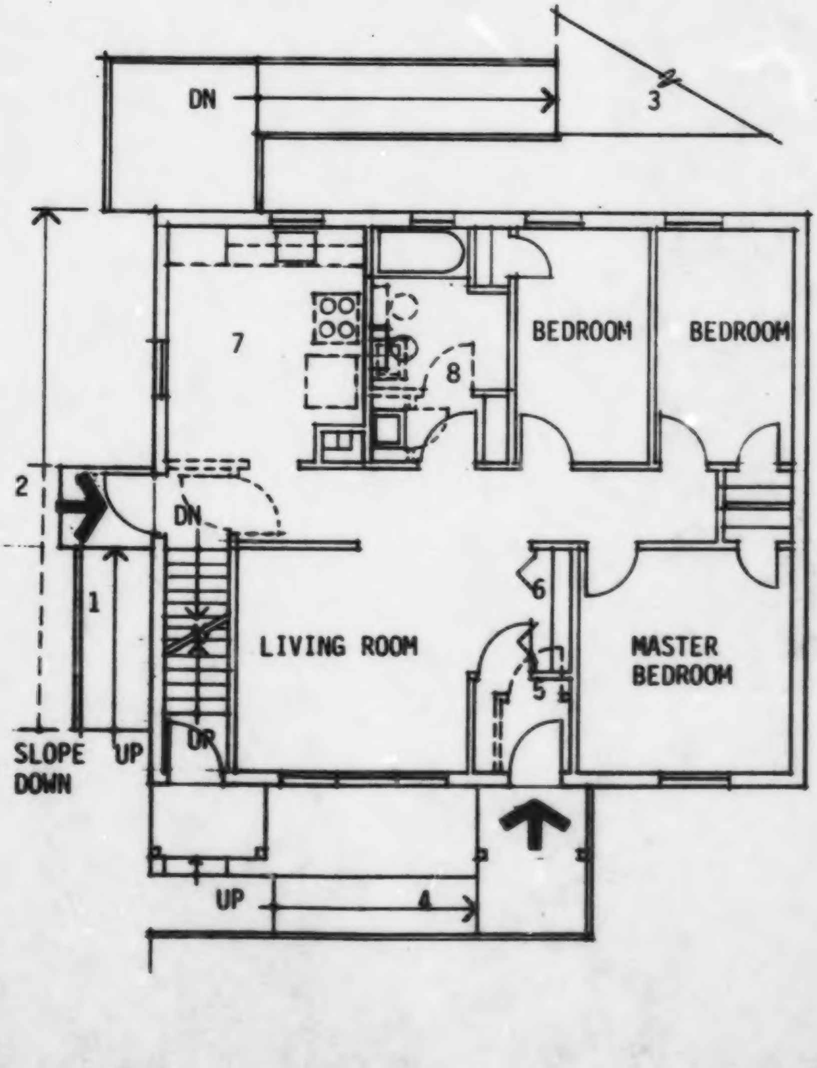
1. Includes a ramp and handrails to the front door, reducing the slope of the side ramp and provision of handrails, and regrading of the driveway to a 1:12 slope.
2. Includes 14 square metres of sidewalk in the rear garden.
3. Includes providing a 1 500 mm^2 vestibule at the front door.
4. Includes a total renovation of the kitchen: incorporating the area of the back vestibule into the kitchen by removing separating walls; installing new low counters with knee clearance and toe space, low wall hung cupboards, stove with front controls, wall oven with a side swinging door, reachable outlets and switches, lever handle sink with insulated drain and new lighting and finishes.
5. Includes relocating storage and clothes closets to the front hall, provision of a wider door, spacing out of plumbing fixtures, grab bar, a telephone shower, lower medicine cabinet and mirror, lever handle faucets and washbasin drain insulation.


6
DN
5
2
UP
3
4
1
STREET

CASE STUDY NO. 13

SITE PLAN

1. Ground floor user's apartment.
2. Steep slope Asphalt driveway.
3. Entrance to upper floor apartment.
4. Step at front entrance.
5. Entrance ramp - no handrails.
6. Wood deck and ramp.


DN
3
7
8
BEDROOM
BEDROOM
2
DN
1
6
LIVING ROOM
MASTER BEDROOM
5
SLOPE DOWN
UP
UP
UP
4

APARTMENT PLAN

Recommendations:

1. Provide handrail for ramp & reduce gradient.
2. Regrade driveway to reduce slope to backyard.
3. Add concrete patio.
4. Add ramp with handrails and landing.
5. Enlarge front vestibule.
6. Add coat closet adjacent to vestibule.
7. Renovate to provide accessible kitchen.
8. Enlarge bathroom.

CASE STUDY NO. 13 - PHOTOGRAPHS

Side ramp and landing.
No handrails provided.

CASE STUDY NO. 13 - PHOTOGRAPHS

Low clothing rod and shelf in user's bedroom.

Low shelf added above sink. Kitchen not adapted for wheelchair user. User has difficulty reaching sink and faucets.

CASE STUDIES
PRAIRIE REGION
(Winnipeg, Manitoba)

CASE STUDY 14
Private Home
Module 2: Purpose-built

CASE STUDY 15
Apartment
Module 4: Purpose-built

CASE STUDY 16
Private Home
Module 1: Conversion

CASE STUDY 17
Apartment/Transitional Residence
Module 4: Purpose-built

CASE STUDY 14

14

REGION: Prairie

PROJECT: Private Home (single-storey)
Winnipeg, Manitoba

MODULE 4: Purpose-built

DESCRIPTION OF USERS

The users are a married couple, both confined to wheelchairs as a result of contracting polio in 1953. He is quadraplegic and she is paraplegic. She is independent in all transfers and personal care and assists her husband in transferring (with a hoist) and personal care. A relative helps with shopping, and they hire or receive neighbours' help for gardening, snow shovelling, painting, and so on. He is employed and she is a homemaker. they have a two-year-old daughter. The family income is in the $20 000 - $30 000 range.

DESCRIPTION OF HOUSING

This couple designed and built their home in 1978. The major design criteria was that it should accommodate their particular needs without containing features that would affect the resale value. The site and the neighbourhood were selected for their appropriateness to the needs of the users. The house is a single-storey brick and cedar dwelling with a basement. There is a living/dining room area, a kitchen, a family room, a bathroom and two bedrooms. The living/dining/family area has a hard twist carpet. The master bedroom has bathroom facilities within it. There is both a front (covered) and back patio area. The house is 130 square metres and has a two-car garage.

METHOD OF FINANCING

The house was financed with private funds.

DISABILITY-RELATED FEATURES

Exterior

The grade is raised to the level of the house so that no steps are required at the front or back entrances. The driveway is sloped, wide and paved, and there is a sloped concrete sidewalk at one side of the house, and from the driveway to the front door. There is a two-car garage with automatic garage door control and direct level access to the house. This door has a sill with bevelled edge and a low door pull on the exterior in addition to the low lever handle.

Interior Public Areas

Not applicable.

Dwelling Unit

The house is a single level with a spacious open design that permits good mobility for two wheelchairs. There is a vertical hoist to the basement next to the garage entrance and it has a low lever control. The front entrance is large and the entry to the living room is wide enough for two wheelchairs. Some of the windows are low and window hardware is the winding ratchet type. The entrance from the garage leads to a wide hallway, with sliding doors and storage shelves/cupboards on either side. This area serves as the "utility room" and also contains laundry facilities. The wall across from the master bedroom has been slightly angled to permit a better approach to the doorway. The basement is large and open with shelving/storage along the walls.

The kitchen has a tri-level counter system, low cupboards, knee clearance under the sink and some counter area, and large roll-out drawers with large handles. There is a counter-top stove with side controls, and a side opening wall oven. The faucet is the single-lever type.

The main bathroom has a doorway 760 mm wide, a washbasin with knee clearance and a single lever handle faucet, and a raised bathtub with side lever handle faucet.

The master bedroom also contains bathroom facilities along one wall; these are not enclosed. They include a toilet with grab bar, washbasin/vanity with knee clearance and single lever handle faucet, and a wheelchair shower which also serves as a storage area for a lift. The shower floor area is slightly recessed, the sill has been ramped and the soap dish and lever handle faucet is low.

The bedrooms have large closets with sliding doors, and two-level clothing rods.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The users are entirely satisfied with their home. The only problems noted are that the back patio should be larger, some windows should be larger and lower, main doors (magnetic) should be easier to open, and the bedroom and perhaps bathroom doors could have been wider. The users have also had problems with the sidewalk cracking and heaving.

This is a cost-effective example of a home for a disabled couple provided in such a manner that it is functionally very good, the appearance is as regular as possible and the resale value is good.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The vertical hoist does not appear to meet code requirements. Other aspects that do not meet guidelines for design for disabled persons are mentioned in Functional Adequacy above.

ADMINISTRATION/CONSTRUCTION

Construction was by a general contractor.

COMMENTS

This case study is a unique example of housing for disabled persons in that it is a home for two disabled persons, is purpose-built and is designed in such a manner that its appearance is as regular as possible. It is an illustration of the idea that good design of "regular" housing can eliminate most barriers to disabled persons.

Existing Information on Costs

The total construction cost of the house (in 1978 dollars) was \$65 545. (In mid-1982 dollars this is \$97 700.) This includes: \$720 to excavate and raise the grade, \$1 130 for the lift and shaft, \$3 300 for the master bedroom plumbing, and \$300 for extra features of the kitchen cabinets.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of disability-related features: $9 170.

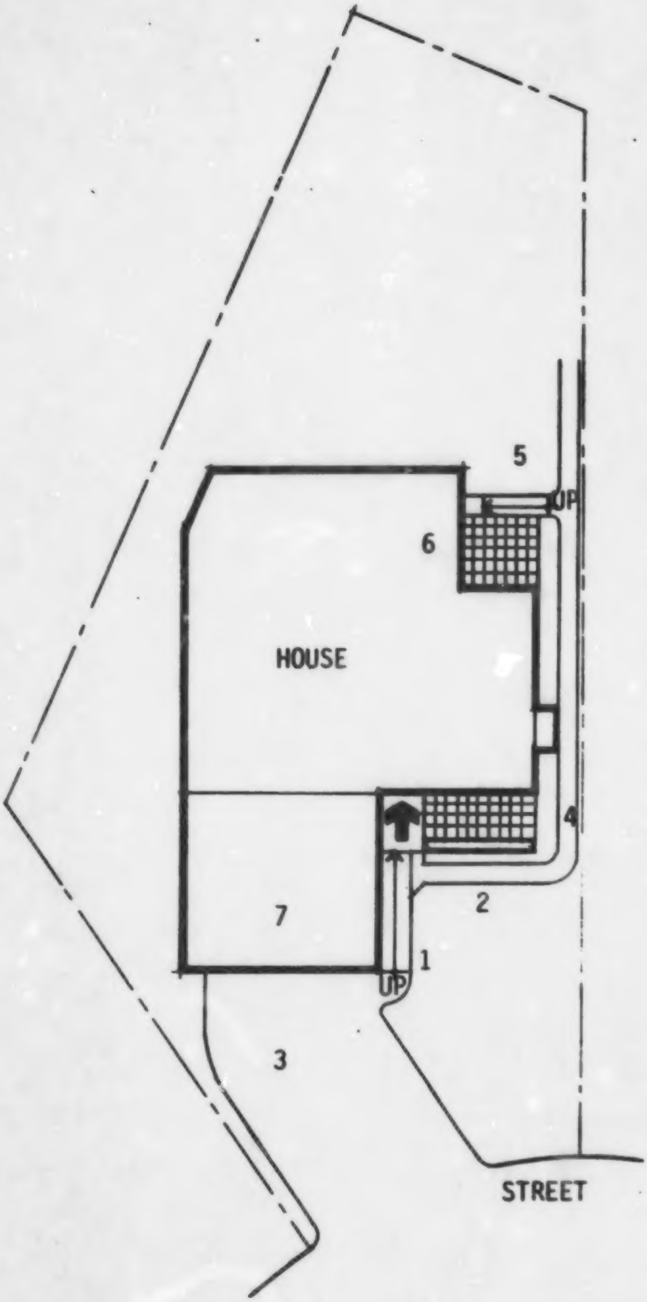
See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Construction

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area		N/A
Parking[1]		300	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall		N/A
Ramps[2]		1 300	Common areas			Living		N/A
Doors[3]		120	Lounges			Kitchen[4]		870
Paving		N/A	Laundry			Bedroom[5]		60
Other			Elevating systems			Bathroom[6]		3 270
Hand-rails		N/A	Elevators			Service areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment		N/A
			Systems			Services		N/A
			Other			Systems[7]		3 000
			Handrails			Windows[8]		250
			Corner guards			Other		
						Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		1 720						7 450

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on special features being incorporated in the original construction.

1. Includes remote door opener.
2. Includes raising the grade and providing basement window areaways and a ramp from the patio.
3. Includes bevelled sill (NC), low lever handle and door pull at the garage door.
4. Includes knee clearance at the sink and other counter space (NC), lower counters and wall cabinets, roll out drawers, side control stove (NC), side opening wall oven and lever faucet.
5. Includes two-level clothing rods.
6. Includes a wide doorway, knee space at the washbasin (NC), lever faucets at the washbasin and bath and a raised bathtub as well as a fully equiped washroom in the master bedroom complete with a wheelchair shower.
7. Includes a vertical hoist; the provision of an elevator or a hoist with improved safety features would substantially increase cost.
8. Includes crank operation for five windows.


5
UP
6
HOUSE
4
7
2
1
UP
3
STREET

CASE STUDY NO. 14

SITE PLAN

1. Concrete sidewalk ramped to front entrance.

2. Covered patio at front entrance.

3. Wide asphalt driveway.

4. Concrete sidewalk.

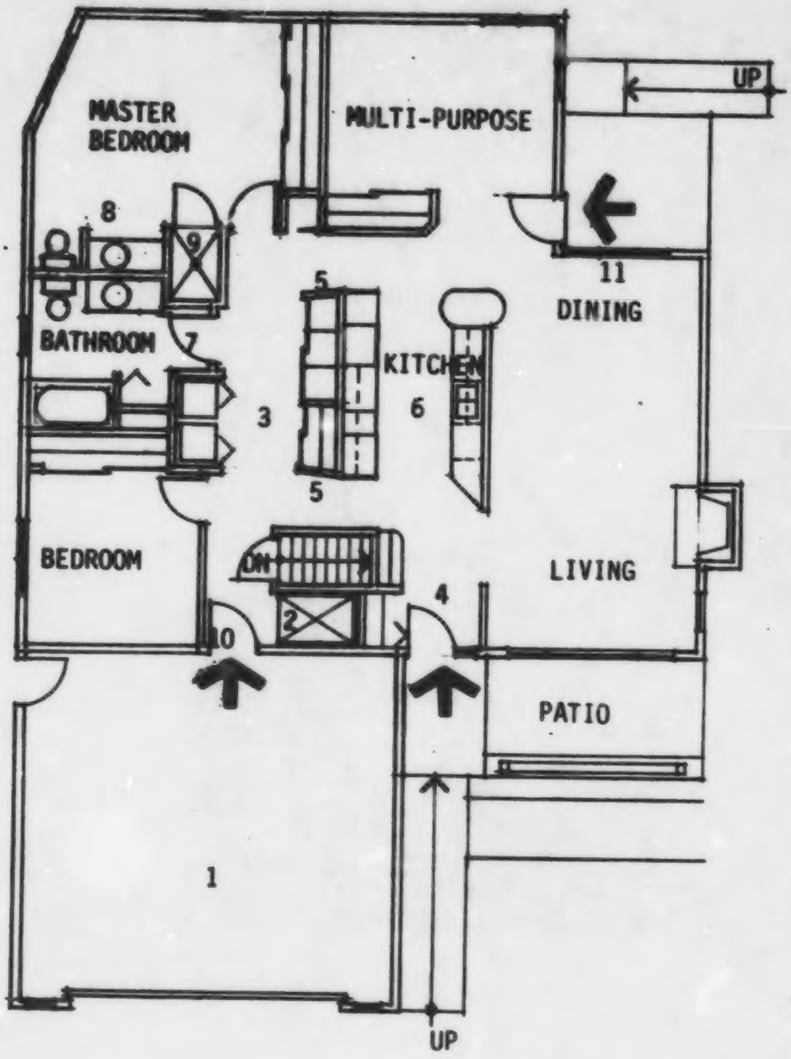
5. Concrete ramp up to patio.

6. Patio.

7. Two-car garage with automatic door opener.

CASE STUDY NO. 14

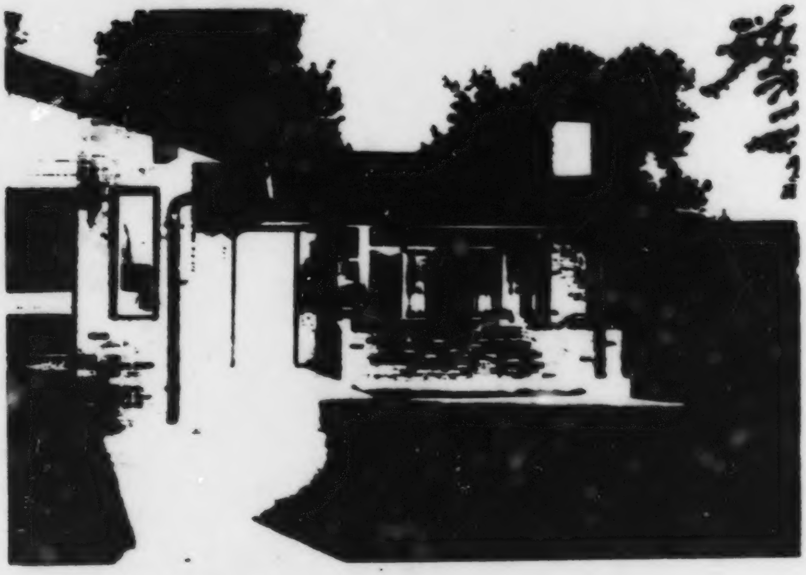
FLOOR PLAN


MASTER BEDROOM
MULTI-PURPOSE
UP
8
9
5
11
DINING
BATHROOM
7
KITCHEN
3
6
5
BEDROOM
DN
LIVING
4
2
10
PATIO
1
UP

1. Garage
2. Vertical hoist between ground floor & basement levels.
3. Wide hallway - storage shelves & cupboard with sliding doors on one side, laundry facilities on the other.
4. Large front entrance.
5. Angled walls to assist wheelchair mobility.
6. Kitchen with 3 levels of counters, lower cupboards, knee clearance under sink and counter; large roll-out drawers with large handles; counter-top stove and a side opening wall oven.
7. Bathroom has 760 mm doorway, wash basin with knee clearance and raised bathtub.
8. Bathroom fixtures in master bedroom.
9. Wheelchair shower.
10. Bevelled door sill and additional door pull.
11. Crank operation for windows.

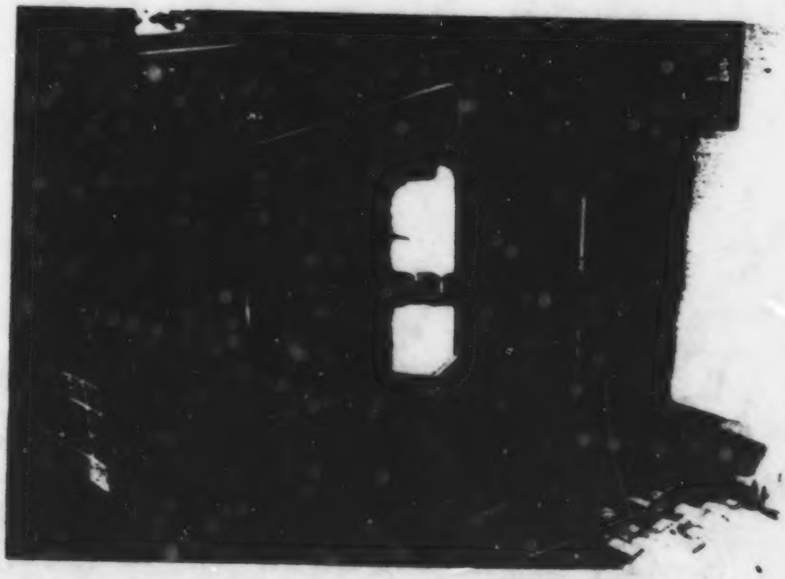
CASE STUDY NO. 14 - PHOTOGRAPHS

Grade raised to level of house
to avoid use of steps.



CASE STUDY NO. 14 - PHOTOGRAPHS

Counter top stove with knee clearance and side controls.



Side hinged wall oven with pull-out board underneath.

CASE STUDY NO. 14 - PHOTOGRAPHS

Vertical hoist with lever control.

Wheelchair shower also serves as storage area for lift.

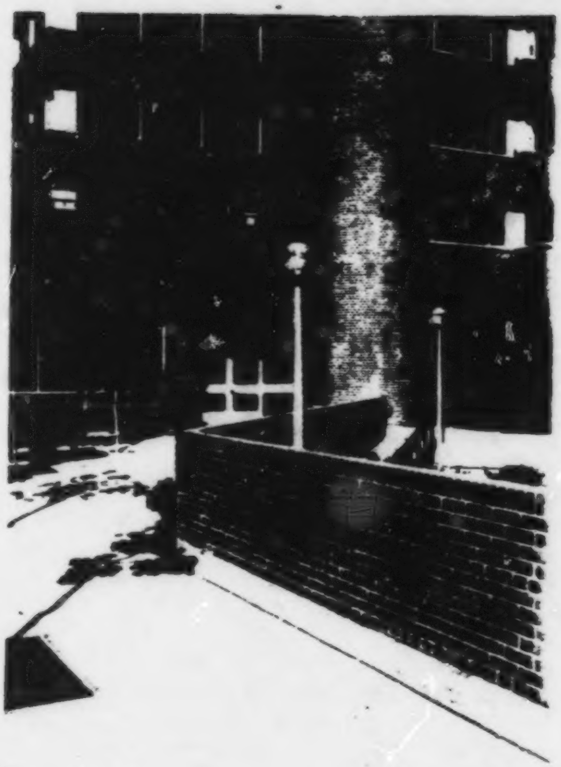
CASE STUDY 15

15

REGION: Prairie

PROJECT: Apartment (6-storey)
Winnipeg, Manitoba

MODULE 4: Purpose-built



DESCRIPTION OF USER

The user is a woman in her early eighties who has been deaf since she was three, as a result of scarlet fever. She has little or no residual hearing and does not use a hearing aid. She has been involved in teaching hearing impaired people for many years. Her annual pension income is under $8 000, of which she pays 25 per cent for rent of her bachelor unit. She has lived here since 1977.

DESCRIPTION OF HOUSING

This residence is in a 6-storey, 200-unit apartment/residence for people with hearing impairments and other disabilities. The core building contains 21 one-bedroom apartments, 120 self-contained and 36 non-self-contained bachelor apartments, and 22 personal care units. The building also serves as a centre for the deaf community in Winnipeg. It was completed at the end of 1975.

DISABILITY-RELATED FEATURES

Exterior

The building is wheelchair accessible. There are exterior ramps (sloped walkways), three parking spaces for disabled persons and an automatic main door operated with a push plate.

Interior Public Areas

The building contains an amphitheatre specially designed for the hearing impaired. The main floor has a cafeteria to serve those residents in the personal care units, non-self-contained bachelor units, and others not able to prepare their meals on a regular basis. A teletype machine in the reception area sends and receives typewritten conversations when it is hooked up to a telephone. The recreation area on the main floor is equipped with coloured strobe lights that can be connected to a music amplifier system that allows the hearing impaired to "hear" and dance to music. The public areas were included because the building serves the city's deaf community as well as the residents.

Dwelling Unit

There are a number of special features for the hearing impaired in each unit. Instead of the usual intercom system, when a visitor dials a call number in the lobby a white strobe light flashes in the apartment. The resident can view the visitor by closed circuit TV (received on an ordinary TV set). To admit the visitor, the resident pushes a button, which buzzes, lights up an entry sign and opens the front door. For the fire alarm, in addition to the audible alarm, coloured strobe lights (separate from the entry system) flash in living rooms, bedrooms and common areas to provide a warning. Each unit is also equipped so that a vibrator can be connected to the fire alarm system; if placed in the bed, this would waken the resident in the event of fire. There is also an emergency call system in the bathroom connected to a red light outside the apartment above the door and to a central panel.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

There were no problems noted with respect to the special features for the deaf. Problems arise, however, in that many of the occupants have disabilities other than, or in addition to, hearing impairment. There is no audible cue to the entry system, yet this would be of benefit to people with hearing. Neither were any of the units designed for semi-ambulatory or non-ambulatory residents. Some minor renovations are being made to some units (widening bathroom doors, for example, or adding grab bars) as required.

On the whole, this seems to be a cost-effective method of providing specialised housing for hearing impaired people.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES
The work meets code requirements for wheelchair accessibility (exterior and main entrance) and special features for the hearing impaired. The units do not meet design requirements for wheelchair users, as it was not the original intention to house people with disabilities other than hearing impairments.

ADMINISTRATION/CONSTRUCTION
The construction was by a general contractor for a fixed sum.

COMMENTS
This case study is a unique example of providing housing for the hearing impaired. It was originally planned to be much smaller but for economic reasons was built with 200 units. This causes a problem in that people with disabilities other than, or in addition to, hearing impairment live here and the building has not been designed to accommodate them.

Existing Information
The contract price in 1974 was $3 370 765 or about $307 32 per square metre. In mid-1982 dollars, this is approximately $6 770 000 or about $667 per square metre.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of the special features: $1 240 per unit.

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Construction

Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways	N/A	N/A	Additional area	N/A	N/A	Additional area	N/A	
Parking[1]	NC	NC	Circulation			Circulation		
Entrance			General	N/A	N/A	General	N/A	
Steps	N/A	N/A	Corridors	N/A	N/A	Hall	N/A	
Ramps[2]	NC	NC	Common areas			Living	N/A	
Doors[3]	15	2 500	Lounges	N/A	N/A	Kitchen	N/A	
Paving	N/A	N/A	Laundry	N/A	N/A	Bedroom	N/A	
Other			Elevating systems			Bathroom	N/A	
Hand-rails	N/A	N/A	Elevators	N/A	N/A	Service areas		
			Ramps	N/A	N/A	Utility	N/A	
			Stairs	N/A	N/A	Storage	N/A	
			Specialties			Other areas	N/A	
			Equipment	N/A	N/A	Specialties		
			Services	N/A	N/A	Equipment	N/A	
			Systems[4]	25	5 000	Services	N/A	
			Other			Systems[5]	1 200	
			Handrails	N/A	N/A	Other		
			Corner guards	N/A	N/A	Corner guards	N/A	
	15			25			1 200	

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on special features being incorporated in the original construction.

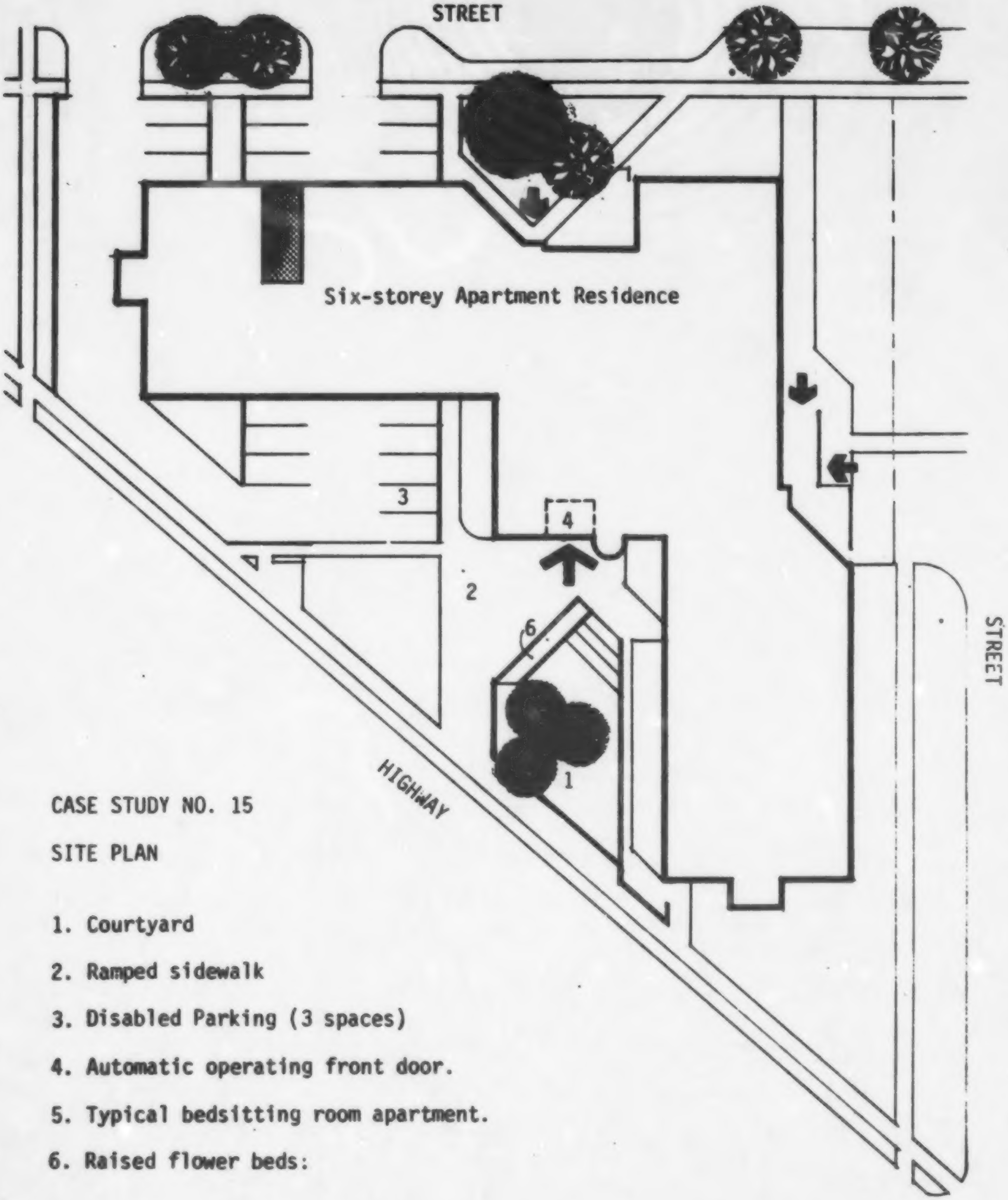
1. Parking is standard.

2. Ramps are part of the natural grading of the property.

3. Includes extra cost for automatic door action with push plates.

4. Includes a front door closed circuit T.V. monitor connected to the house antenna system.

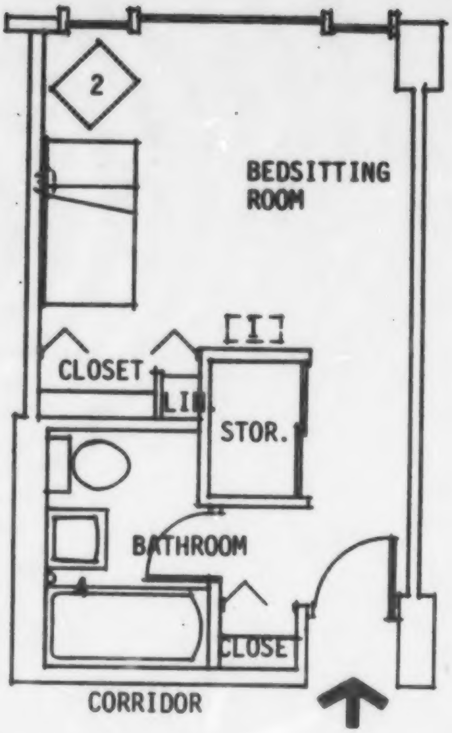
5. Includes a strobe light intercom and fire alarm, a vibrator fire alarm device, and emergency call system from the bathroom.


STREET
Six-storey Apartment Residence
3
4
2
6
1
HIGHWAY
STREET

CASE STUDY NO. 15

SITE PLAN

1. Courtyard
2. Ramped sidewalk
3. Disabled Parking (3 spaces)
4. Automatic operating front door.
5. Typical bedsitting room apartment.
6. Raised flower beds:


2
3
BEDSITTING ROOM
CLOSET
LIN.
STOR.
1
BATHROOM
4
CLOSET
CORRIDOR

CASE STUDY NO. 15

APARTMENT PLAN

1. Strobe lights connected to front entrance for visitors and fire alarm system.

2. Closed circuit T.V. for visual observation of visitors at lobby.

3. Vibrator fire alarm.

4. Emergency call system connected to red light above resident's door in corridor, and to central panel.

CASE STUDY 16

16

REGION: Prairie

PROJECT: Private Home (split-level)
Winnipeg, Manitoba

MODULE 1: Conversion - RRAP Funding

DESCRIPTION OF USER

The user is a woman in her early fifties who has been confined to a wheelchair for about a year. She is a C-7,8 quadraplegic and requires about five hours a day of attendant care for transferring and personal care. In addition, her three teenage daughters live at home, help with personal care and are doing the housework, shopping and meal preparation. She has been home from the hospital for only a few months and hopes that her strength and independence will improve. She receives less than $8 000 a year in disability pension and child support. She and her family have lived in this home for twenty-three years.

DESCRIPTION OF HOUSING

The home is a detached wood-frame split-level house, with a stepped front and a side entrance. While in hospital, her rehabilitation counsellor arranged for an interior vertical hoist, a concrete side ramp and a second-storey bedroom to be added to her home.

METHOD OF FINANCING

The renovations were financed by RRAP funds.

DISABILITY-RELATED FEATURES

Exterior

A concrete landing and ramp were added to the side entrance to join the existing sidewalk.

Interior Public Areas

Not applicable.

Dwelling Unit

A bedroom was added to the second level of the house for the user. It has low heat controls, low call buttons for the hoist and a low light switch. A hoist was installed between the ground floor and the new bedroom.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The user is completely satisfied with the renovations except that the new bedroom door could have been wider. If her condition improves, she would also like to make her kitchen accessible. The consultants had some concern about the safety of the vertical hoist as there is no edge or gate around the platform and the user must rely on the wheelchair locking mechanism to remain stationary during transit.

This is a cost-effective solution to make the user's house wheelchair accessible. It permits her and her family to remain in the home in which they have lived for twenty-three years.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

The vertical hoist does not appear to meet code requirements and there are concerns about its safety. There are no handrails on the ramp.

ADMINISTRATION/CONSTRUCTION

Construction was carried out by a general contractor -- a relative, who provided much of the labour without charge. He arranged for an individual who does custom work for residential elevators to make and install the hoist. The user's rehabilitation counsellor made all the arrangements, including application for RRAP funds, while the user was in hospital and the work was completed by the time she returned home.

COMMENTS

This case study is an example of minimum renovations bjeing carried out to an otherwise inaccessible house to allow a recently disabled individual to remain in her home of twenty-three years. Although the house is by no means totally wheelchair-accessible, the user is satisfied, and is pleased that she and her family do not have to move.

Existing Information on Costs

The total RRAP loan was $8 805, of which $1 025 was forgivable. The hoist was $4 400, and the concrete landing and ramp $145; the remainder was for the new bedroom and preparation of the enclosure for the hoist.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of renovations: $12 250.

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disabled-Related Features Built During Conversion of an Existing Building

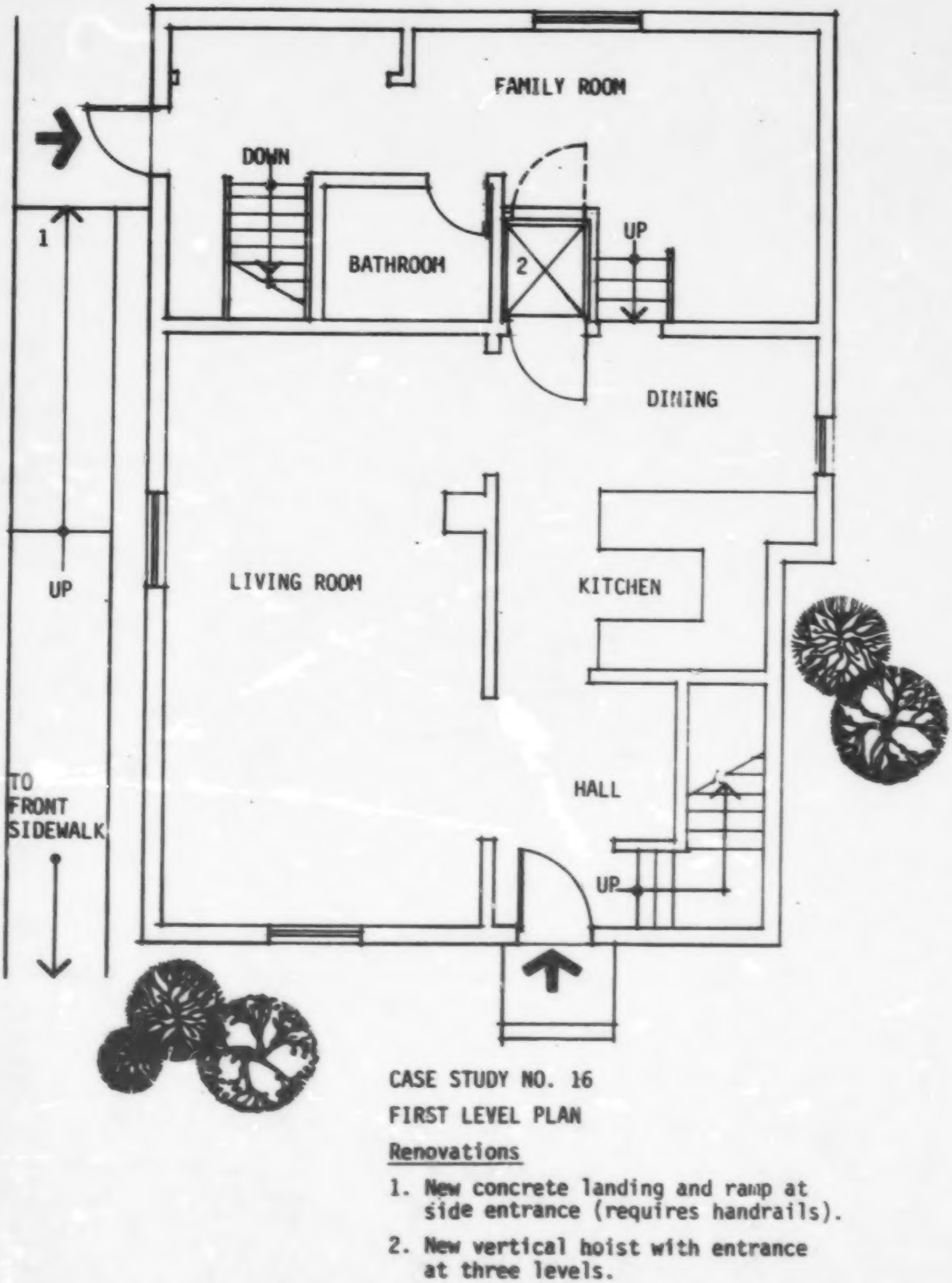
Exterior	Per Unit	Total	Interior Public Areas N/A	Per Unit	Total	Dwelling Unit	Per Unit	Total
Access/ walkways		N/A	Additional area			Additional area		N/A
Parking		N/A	Circulation			Circulation		
Entrance			General			General		N/A
Steps		N/A	Corridors			Hall		N/A
Ramps[1]		250	Common areas			Living		N/A
Doors		N/A	Lounges			Kitchen		N/A
Paving		N/A	Laundry			Bedroom[2]		5 000
Other			Elevating systems			Bathroom		N/A
Hand-rails		N/A	Elevators			Service areas		
			Ramps			Utility		N/A
			Stairs			Storage		N/A
			Specialties			Other areas		N/A
			Equipment			Specialties		
			Services			Equipment		N/A
			Systems			Services		N/A
			Other			Systems[3]		7 000
			Handrails			Other		
			Corner guards			Corner guards		N/A
						Balcony sill ramp		N/A
						Balcony elevating ramp		N/A
		250						12 000

Note: The following items were considered as potentially contributing to additional cost. Cost estimates are based on renovations to an existing facility.

1. Includes a concrete landing and ramp.

2. Includes an addition at the rear of the house to create a bedroom.

3. Includes a vertical hoist; the provision of an elevator or a hoist with improved safety features would substantially increase cost.

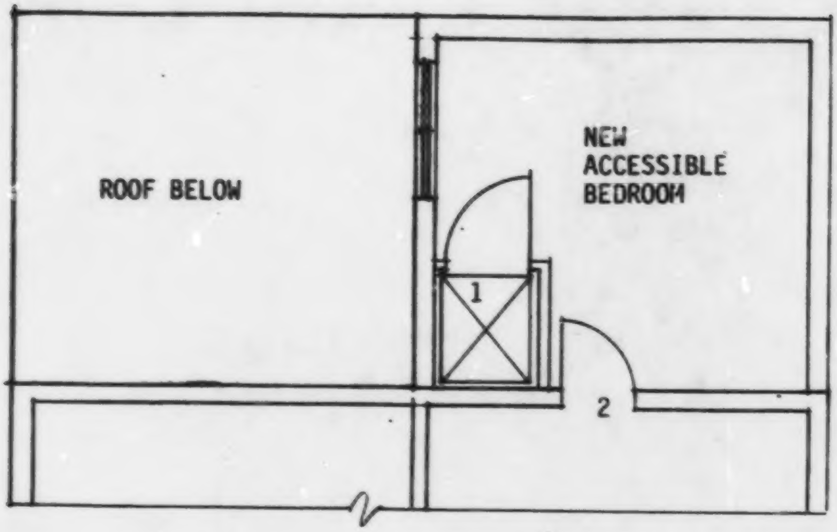

FAMILY ROOM
DOWN
BATHROOM
2
UP
1
DINING
LIVING ROOM
KITCHEN
UP
HALL
UP
TO FRONT SIDEWALK

CASE STUDY NO. 16

FIRST LEVEL PLAN

Renovations

1. New concrete landing and ramp at side entrance (requires handrails).
2. New vertical hoist with entrance at three levels.

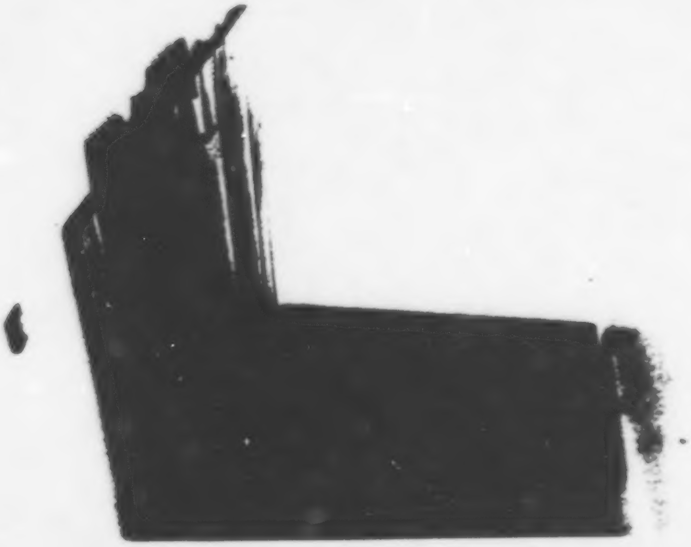

ROOF BELOW
NEW ACCESSIBLE BEDROOM
1
2

CASE STUDY NO. 16

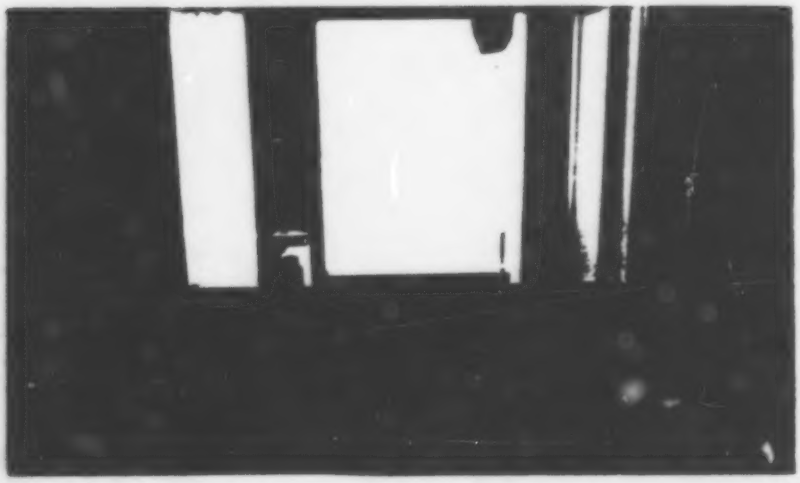
SECOND LEVEL PLAN

1. New vertical hoist.
2. Connection to second level.

CASE STUDY NO. 16 - PHOTOGRAPHS



Vertical hoist to all three levels.



Half door entrance to vertical hoist from kitchen.

Concrete ramp and landing at side entrance.

CASE STUDY 17

17

REGION: Prairie

PROJECT: Apartment/Transitional Residence (3-storey)
Winnipeg, Manitoba

MODULE 4: Purpose-built

DESCRIPTION OF USER

The user is a woman in her late twenties who is confined to a wheelchair following an accident about a year ago which left her a C-6,7 quadraplegic. She is independent in transferring, requires minimal personal care and homemaking assistance, and drives a wheelchair van. She receives about $1 200 a month from Workmen's Compensation disability insurance and pays about 25 per cent of it for rent. She plans on obtaining some job retraining in the near future. She has been living here for about one year.

DESCRIPTION OF HOUSING

This 3-storey apartment/transitional residence was completed in mid-1975. It contains 75 one-bedroom wheelchair adapted apartments, of which 25 are for severely disabled persons and 25 for less severely disabled persons. The remaining 25 units are reserved for non-disabled people. Tenants sign a one-year lease and are encouraged to obtain maximum residential independence during this time, and then move to a more independent living situation. Twenty-four-hour personal care, housekeeping assistance and counselling are available as required.

METHOD OF FINANCING

Construction was financed under the National Housing Act, Section 56.1 (90 per cent) and the Manitoba Housing Renewal Corporation (10 per cent).

DISABILITY-RELATED FEATURES

Exterior

Underground parking for disabled persons provides an automatic door and direct access to the building. The building has a covered wide walkway and level entrance, automatic sliding double glass doors at the main entrance and raised flower beds.

Interior Public Areas

The spacious lobby has a low intercom and low mail boxes with a low shelf beneath. The hallways are wide with wheelchair bumper guards and hard close-looped carpet throughout. The elevator is slow closing with low call and cab buttons and there is an interior ramp from the basement to the third floor for fire exit. There are laundry facilities and a lounge area on each floor.

Dwelling Unit

The door to the apartment has no sill; it has low lever handles, and a second low horizontal handle on the exterior of the door for pulling it shut when exiting. The apartments are spacious and planned for maximum wheelchair mobility with wide doorways, bifolding doors, no door sills and good circulation and approach to doorways. There are low windows, raised electrical outlets, low shelves and rods in the front and bedroom cupboards and a wheelchair storage cupboard. There are built-in low corner shelves in the front entrance and bedroom.

The kitchen has low cupboards; low counters with knee clearance; a sink with knee clearance, insulated pipes, and a side lever handle faucet; front controls on the oven; and a drop-leaf pass-through counter which can also serve as an eating area.

The bathroom has a raised tub with a built-in transfer ledge, a hand shower, bath and toilet grab bars, a low washbasin with knee clearance, insulated pipes, a lever handle faucet and a low mirror.

FUNCTIONAL ADEQUACY/COST EFFECTIVENESS

The only problem noted by the user is that the door from the underground parking to the building has a latch that is very difficult to operate. The design is otherwise very good. Laundry facilities are standard but posed no problem for the user. A front loading, front controls washer and dryer are available on the main floor if required.

This is a relatively expensive project which apparently was well over budget. This, coupled with the fact that one-third of the adapted units are occupied by non-disabled persons, makes this project a relatively expensive solution to providing housing for disabled persons.

CODES/STANDARDS/REQUIREMENTS/GUIDELINES

All the work meets or exceeds requirements for designing for disabled persons, the only problem being noted in Functional Adequacy above.

ADMINISTRATION/CONSTRUCTION

Construction was by a general contractor for a fixed-sum contract (tender call).

COMMENTS

This case study is an example of a very well designed apartment/transitional residence for disabled and non-disabled persons. Management is committed to reserving one-third of the units for non-disabled persons for the benefit of having an integrated living situation despite community pressure to make them available for disabled persons. It was also noted that occasional problems arise in persuading tenants to move to a more independent living situation at the end of their one-year lease; legally they cannot be made to leave.

Existing Information on Costs

The total construction cost was $2 198 506 or $29 313 per unit ($1974). In mid-$1982 this has been estimated as $4 650 000, $62 000 per unit.

Cost Estimates (table 1)

Cost estimates have been prepared based upon available information, drawings and interviews.

Costs are estimated for mid-1982 in the city of the case study location. Appendix 5 may be used to convert cost estimates from one geographic region or city to another and to predict future costs of disability-related features.

Costs are additional only to the standard found in conventional facilities, unless otherwise noted.

The list of items for which costs were estimated is standard for all case studies and includes disability-related items selected for study by the consultants.

Where an item does not exist, or does not incorporate disability-related areas or features, the item or group of items is denoted by N/A - not applicable.

Where an item is applicable but at no extra cost, the item is identified by NC - no cost.

Where an item created a saving in cost, this saving is not identified and the item is denoted by NC.

For apartment buildings, the applicable costs for the sections Exterior and Interior Public Areas are given as total costs. The total costs have been divided by the number of disability-related units to indicate the costs for each dwelling unit.

For private and group homes, total costs only are used. The section Interior Public Areas is not applicable; all disability-related features are considered under Exterior and Dwelling Unit.

Estimated costs of recommended upgrading, together with an estimate of costs had these items been included at the time of construction, are provided in case studies classified as Module 3 (upgrading recommended).

Summary of estimated costs of the disability-related features: $3 345 per unit.

See table 1 for detailed cost estimates.

Table 1 Estimated Costs (mid-1980 dollars) of Disability-Related Features Built During Construction

Exterior	Per Unit	Total
Access/ walkways	N/A	N/A
Parking[1]	NC	NC
Entrance		
Steps	N/A	N/A
Ramps	N/A	N/A
Doors[2]	80	6 000
Paving	N/A	N/A
Other		
Hand- rails	N/A	N/A
Raised flower beds[3]	25	2 000
	105	

Interior Public Areas	Per Unit	Total
Additional area	N/A	N/A
Circulation		
General	N/A	N/A
Corridors[4]	600	N/A
Common areas		
Lounges[5]	NC	NC
Laundry[6]	NC	NC
Elevating systems		
Elevators[7]	10	750
Ramps[8]	335	25 000
Stairs	N/A	N/A
Specialties[9]		
Equipment	N/A	N/A
Services[3]	N/A	N/A
Systems[4]	NC	NC
Other		
Handrails	N/A	N/A
Corner guards	N/A	N/A
Bumpers[10]	100	7 500
Floor covering[11]	NC	NC
	1 045	

Dwelling Unit	Per Unit	Total
Additional area[12]	1 500	
Circulation		
General	N/A	
Hall[13]	N/A	
Living	N/A	
Kitchen[14]	80	
Bedroom[15]	NC	
Bathroom[16]	380	
Service areas		
Utility	N/A	
Storage[17]	NC	
Other areas	N/A	
Specialties		
Equipment[18]	150	
Services[19]	25	
Systems[20]	60	
Other		
Corner guards	N/A	
	2 195	

Note: The numbered items were considered potentially contributing to additional cost. Cost estimates are based on special features being incorporated in the original construction.

1. Parking is standard (NC).

2. Includes two automatic sliding doors.

3. Includes six raised flower boxes.

4. The corridor width exceeds a standard 1 730 mm by 940 mm and the main lobby is spacious (NC).

5. Includes social and recreation areas (NC).

6. Includes laundry facilities on each floor (NC).

7. Includes lower elevator, call and cab buttons and slow closing door (NC).

8. Includes one ramp and credit of $28 000 for a single stair.

9. Includes a low intercom (NC) and low mail boxes (NC) with a low shelf below (NC).

10. Includes wheel bumper guards.

11. Includes a hard close-looped carpet throughout.

12. Apartment 306 exceeds a basic gross area of 48 square meters by 7 square meters.

13. Includes a wide entrance doorway (NC) with no sill (NC) and wide bifolding door to the closet (NC).

14. Includes a wide bifolding door (NC), low cupboards (NC), low counter and sink with knee clearance (NC), insulated pipes and a lever handle faucet at the sink, front control stove and drop leaf pass through door (NC).

15. Includes a wide bifolding door (NC).

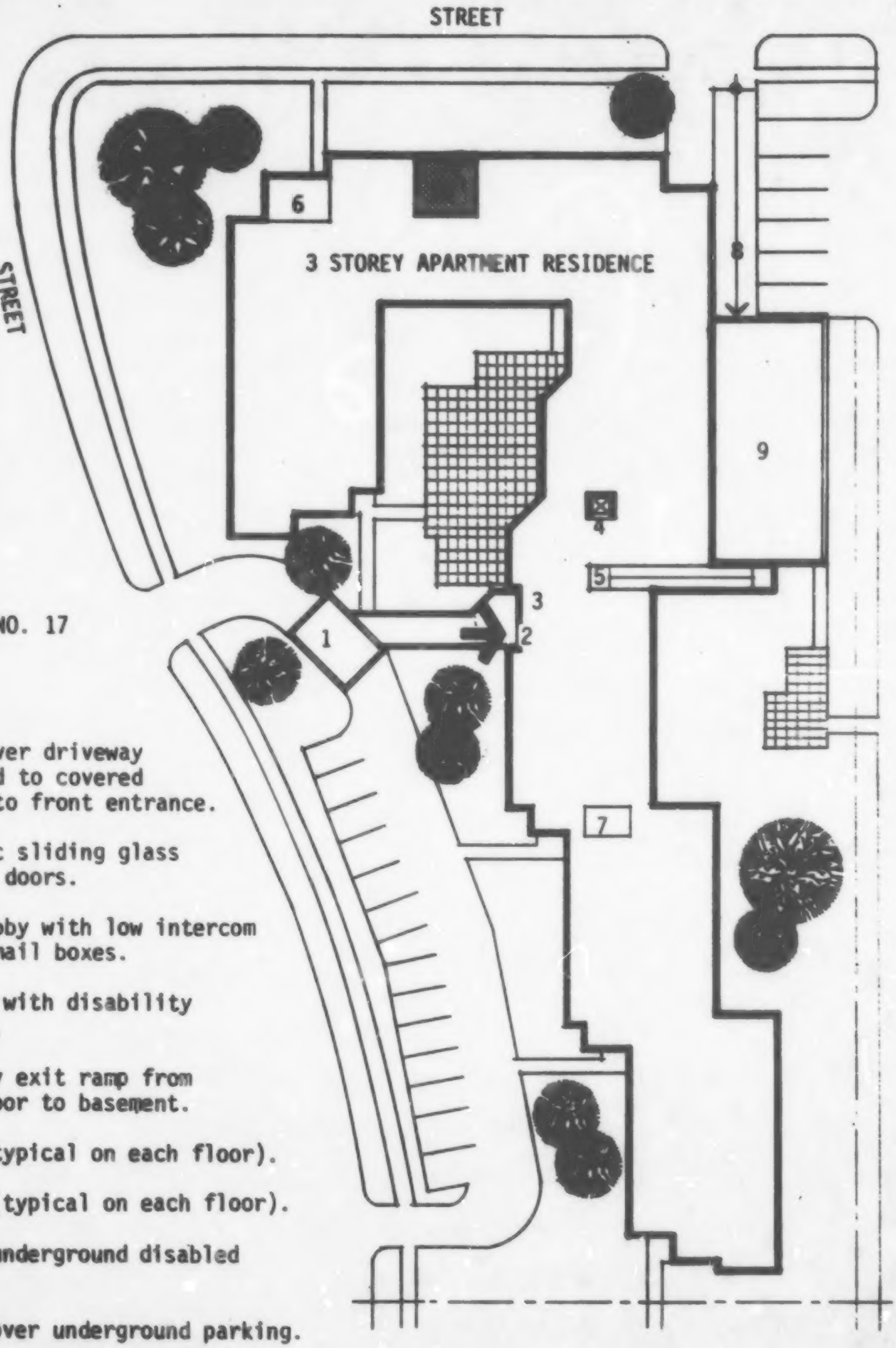
16. Includes a wide bifolding door (NC), raised tub with built-in transfer ledge, telephone shower and temperature controlled faucet (NC), bath and toilet grab bars, low washbasin with knee clearance (NC), insulated pipes and lever handles and a low mirror.

17. Includes a wheel-in storage area (NC).

18. Includes built-in low corner shelves in front entrance and bedroom.

19. Includes eight raised electrical outlets and five lowered light switches.

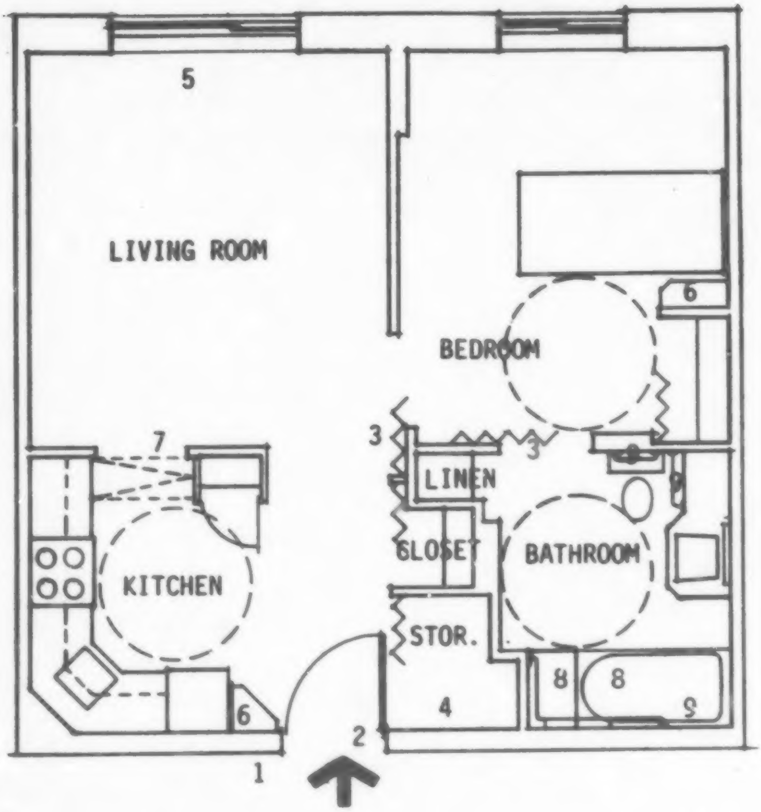
20. Includes one lever door handle and front door pull, low windows (NC), low rods and shelves (NC).


STREET
STREET
3 STOREY APARTMENT RESIDENCE
1
2
3
4
5
6
7
8
9

CASE STUDY NO. 17

SITE PLAN

1. Canopy over driveway connected to covered walkway to front entrance.
2. Automatic sliding glass entrance doors.
3. Large lobby with low intercom and low mail boxes.
4. Elevator with disability features.
5. Emergency exit ramp from third floor to basement.
6. Lounge (typical on each floor).
7. Laundry (typical on each floor).
8. Ramp to underground disabled parking.
9. Terrace over underground parking.
10. Typical accessible apartment.


5
LIVING ROOM
BEDROOM
6
3
3
7
LINEN
9
CLOSET
BATHROOM
KITCHEN
STOR.
8
8
9
6
4
2
1

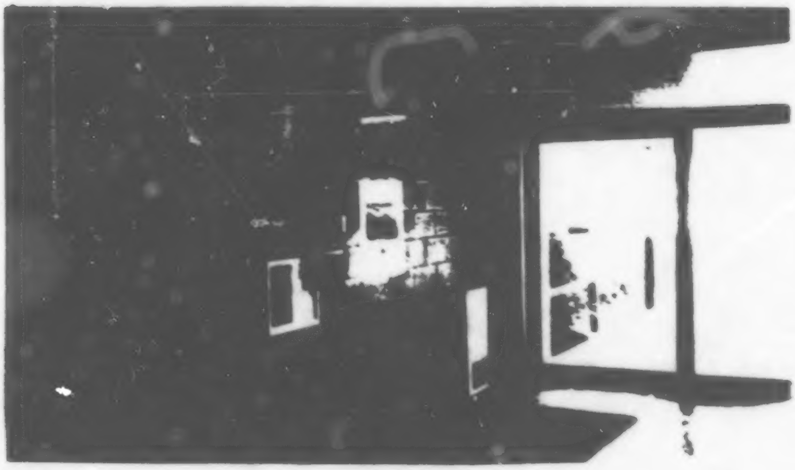
CASE STUDY NO. 17

APARTMENT PLAN

1. Wide corridors with wheelchair bumper guards and hard close-looped carpet.
2. Doorway has no sill, low lever handles and additional handle to close door on exiting.
3. Wide interior doorways with bifolding doors.
4. Wheelchair storage space.
5. Windows are low for maximum visibility.
6. Built-in low corner shelves.
7. Drop-leaf pass-through counter.
8. Raised bathtub with built-in transfer ledge.
9. Grab bars.

CASE STUDY NO. 17 - PHOTOGRAPHS

Interior ramp from basement to third floor for access and fire exit purposes.



Automatic sliding doors at main entrance.

Wheelchair bumper guards, and hard twist carpet in wide hallways.

CASE STUDY NO. 17 - PHOTOGRAPHS

Low mail boxes and shelf underneath.

Low lever door handles and additional door pull.

Drop leaf pass-thru and eating counter in kitchen.

APPENDIX 1 - DATA COLLECTION CHECKLISTS

DATA COLLECTION CHECKLISTS

Preliminary Data Collection Checklist

At the onset of the study a single data collection sheet was developed as a means of facilitating basic information collection on a wide variety of adapted units, located in five designated regions:

- Atlantic Region
- Quebec Region
- Central Region
- Prairie Region
- West Coast Region

This checklist was designed to provide preliminary information on:

- location
- user-disability
- building type;
- degree of building adaption;
- funding source etc.

On the basis of this information, it was possible to select and approve fifteen case-studies for a more in-depth examination, made possible through site visits.

Field Visits - Data Collection Checklists

At this time a twenty page data collection checklist was developed to facilitate the collection and subsequent analysis of information gathered during site visits to the selected case studies. This checklist was sub-divided into three sections:

- General Interview Information
- Housing/Dwelling Information, and
- Cost Information

In this manner it was possible to collect and analyze specific information on design and cost aspects of adapted units in a variety of housing contexts.

CMHC III - COST AND DESIGN GUIDELINES
IN HOUSING DISABLED PERSONS

Preliminary Data Collection Checklist for Screening of Projects for Possible Selection as Case Studies

1.0 CONTACT:

2.0 REGION:

3.0 CITY:

4.0 PROJECT NAME:
ADDRESS:

5.0 BUILDING TYPE:

6.0 USER(S):

7.0 DATE OF BUILDING/CONVERSION COMPLETION:

8.0 NAME OF CONTRACTOR/RENOVATOR:

9.0 FUNDING:

10.0 WORK DONE:

11.0 MEASURE OF ACCEPTABILITY:

12.0 COST:

CANADA MORTGAGE AND HOUSING CORPORATION

COST AND DESIGN GUIDELINES
IN HOUSING DISABLED PERSONS

FIELD VISITS
DATA COLLECTION CHECK LIST

PART 1.0
GENERAL INTERVIEW INFORMATION

PART 2.0
HOUSING/DWELLING INFORMATION

PART 3.0
COST INFORMATION

81111-50.0

March 22, 1982

1.0 GENERAL INTERVIEW INFORMATION

Date and Time of Interview:

Interviewer:

Person(s) Interviewed:

Name:

Affiliation:
(title, owner, user, etc.)

Address:

Telephone No:

Project: Name:

Address:

Telephone:

Region:

1.1 USER INFORMATION

General

Age	Under 21	___	50-64	___
	21-29	___	65-74	___
	30-39	___	75-84	___
	40-49	___	84-over	___

Sex

Role	Homemaker	___	Other Dependent Adult	___
	Head of Household	___	Dependent Child	___
	Working Family Member	___	Other	___

Marital Status

Household Composition

Employment

Paid, Sheltered, Volunteer

Hours

Flexibility

Location/Distance

Travel/Transportation

Income

Combined Family Income	0- $8,000	___	$15,000-20,000	___
	$8,000-15,000	___	$20,000-30,000	___
			over $30,000	___

Source(s) of Income

Other Support

Date of Occupancy

Cost of Accommodation

Accommodation Subsidy

Nature of Disability (ies)

- Non-ambulatory
- Semi-ambulatory
- Coordination Disabled
- Motor Disabled
- Sensory Disabled
  - Visual Impairment
  - Hearing Impairment
  - Tactile Impairment

Medical Diagnosis

Date of Onset of Disability (ies)

Functional Status

Use of Aids

Describe aids including for what activities they are required.

Lifestyle/Functional Changes

Please describe the major lifestyle, and functional changes you have encountered since the onset of your disability.

Function	Independent	Independent with aids (indicate aids	Requires Assistance	Dependent
			(Indicate Service Provider)	
ambulation				
transfers (describe)				
bathing/hygiene				
toiletting				
dressing				
eating				
communication				
Meal prep'n				
laundry				
cleaning				
shopping				
other tasks/ activities				

User Assessment of Living Arrangements

Refer to comments obtained under 2.2 "Acceptability to User and other Occupants".

With what aspects of your living unit are you satisfied?

With what aspects of your living unit are you dissatisfied?

What further adaptations would you or the other occupants like to incorporate, assuming availability of funds? Are they likely to be done? If so by whom? What is the potential source of such funding?

Would these adaptations make you more independent in any of the functions previously discussed?

What is your assessment of surrounding amenities for disabled persons?

2.0 HOUSING/DWELLING INFORMATION

General

Type:
- Apartment
- Private Home (owned or rented)
- Group Home
- Hostel
- Half-way or Transitional Residence
- Other

Structure:
- Single Level
- Split Level
- Duplex, Triplex etc.
- Row Housing
- Apartment
- No. of Storeys
- No. of Units
- No. of Adapted Units

Type of Construction:
- Wood Frame
- Masonry
- Structural Steel
- Reinforced Concrete
- Other
- Combination

Purpose built or Renovated:

Date of Completion:
(initial building)

Date of Renovation:

Date of Occupancy:

Source of Funding:

Specific Accessibility-Related Aspects

Item	Adaptations (Type of Work Done, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupants
Access to Dwelling Unit		
Walks		
Surface		
Width		
Gradient		
Obstructions		
Parking Areas		
Proximity		
Width of Space		
Surface		
Gradient		
Direct Access to Residence		
Operation of Garage Door		

Item	Adaptations (Type of work done, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupant
Entrances to Building		
Location		
Stairs		
Width of Stairway		
Number of Steps		
Railways		
Ramp - Gradient		
Door		
Approach		
Width		
Doorsill Height		
Lock and Handle		
Hallway		
Width		
Obstructions		

Item	Adaptations Type of work done, Materials Dimensional Characteristics Construction Problems)	Acceptability to users and other occupants
Approach to Dwelling Unit		
Hallway		
Width		
Obstructions		
Steps		
Width		
No. of Steps		
Height of Steps		
Railings		
Ramp - Gradient		
Door		
Approach to door (inside and outside)		
Type of lock		
Height of lock		
Type of handle		
Height of handle		
Width of Doorway		
Doorsill - height		
Elevator		
Width of door		
Height of control buttons		
Height of call buttons		
Speed of Closing		

Item	Adaptations (Type of work done, Materials Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupants
Dwelling Unit		
Width of hallways		
Stairs		
Width of Stairway		
Number of Stairs		
Height of Stairs		
Railing L R both		
Doorsills		
Height		
Access between Rooms:		
Hallways		
Bedroom		
Kitchen		
Bathroom		
Living Room		
Other		
Hazards		
Rugs		
Electrical Cords		
Floor Finish		
Furniture		
Hot Water Pipes		
Radiators		

Item	Adaptations	Acceptability
Bedroom		
Door		
Width		
Overall Dimensions		
Light Switch		
Location		
Height		
Type of Switch		
Windows		
Height		
Opening and closing mechanism		
Clothing Storage		
Height of Rod		
Shelving		
Furniture Arrangement		
Electrical Outlet		
Height		
Telephone Outlet		
Height		
Bathroom		
Door		
Width		
Overall Dimensions		
Light Switch		
Location		
Height		
Type		

Item	Adaptations (Type of Work done, Materials Dimensional Characteristics, Construction Problems)	Acceptability to Users and other occupants
Windows		
Height		
Opening and closing mechanism		
Toilet		
Type - wall hung		
- pedestal		
- height of seat from floor		
- location relative to other fixtures, walls		
- support or bars near toilet		
- room for grab bars		
Sink		
Height from floor		
Faucets - type		
Clearance under sink		
Hot water pipes		
Mirror		
Height		
Electrical outlet		
Location		
Height from floor		

Item	Adaptations (Type of work done, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupants
Bathtub		
Type: built-in legs		
Bars or Supports		
Faucets - type		
Drain plug - type		
Height from floor to rim		
Sliding Doors		
Width of tub inside		
Rim 2 sides 1 side		
Material of tub Fiberglass/metal		
Shower Stall		
Floor Dimensions		
Soap Dish		
Height of Faucets		
Type		
Handshower		
Height of lip		

Item	Adaptations (Type of Work Done, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupants
Living Room		
Doorway		
Width		
Light Switch		
Height		
Type		
Windows		
Height		
Opening/closing mechanism		
Furniture Arrangement		
Electrical Outlets		
Location		
Height		
Dining Room		
Doorway		
Width		
Light Switch		
Height		
Type		
Window		
Height		
Opening/Closing mechanism		

Item	Adaptations (Type of Work Done, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupant
Kitchen		
Doorway		
Width		
Counter Arrangement		
L- Shaped		
U Shaped		
Galley		
Counter Height		
Light Switch		
Height		
Type		
Sink		
Clearance under sink		
Depth of sink		
Faucets - type		
Drain		
Hot water pipes		
Shelves and Cabinet		
Handle type		
Height to bottom shelf of upper cabinets		
Depth		

Item	Adaptations (Type of Work Done, Materials Dimensional Characteristics Construction Problems)	Acceptability to Users and other Occupants
Drawers		
Handle - type		
Stove/Oven		
Element Type		
Location of controls		
Type of controls		
Oven door type - side hinge or bottom hinge		
Refrigerator		
Side of door opening L/R		
Arrangement of appliances		
Electrical outlets		
Height		
Location		
How many		
Laundry		
Doorway		
Width		
Location of facilities		

Item	Adaptations (Type of work done, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupants
Laundry		
Washer & Dryer		
Type of Loading - top - front		
Type of Controls - dial - button		
Location of controls		
Laundry Sink		
Height		
Clearance under sink		
Faucets - type		
Storage		
Doorway		
Width		
Height		
Depth		
Location		
Egress		
Route		
Systems		

Item	Adaptations (Type of Work, Materials, Dimensional Characteristics, Construction Problems)	Acceptability to Users and other Occupants
Supplementary Sensory Systems		
(visual, audio and tactile)		
Communication/Information		
Door buzzers/bells		
Intercoms		
Alarm Systems		
Telephones		
Controls		
Heating		
Lighting		
Ventilation		
Water Temperature		
Environmental		
Safety Systems		
Hardware		
Electrical		
Mechanical		
Exits		
Other (specify)		

* Adaption to be evaluated according to Building Standards for the Handicapped, 1980, plus, as well as Consultants' assessment and judgement.

3.0 COST INFORMATION

Construction Cost

Method of Contracting

Inclusion or Exclusion of Federal or Provincial Sales Tax

Value of Free Labour or Materials

Financing

- Administrative Details
- Eligibility Criteria
- Incentives
- Disincentives

Costs of Disability-Related Renovations -

Costs of other Renovations -

Costs of any proposed upgrading to meet current guidelines -

Detailed Cost Breakdown -

Others who may have cost information -

APPENDIX 2 CONSENT FORM

The following Consent Form was developed to obtain the users' consent to participate in the study, to guarantee confidentiality, and to provide the user with a summary of the nature of the study. The Consultants obtained a signed copy from each user for records, as well as leaving a copy with each user.

Associated Planning Consultants Inc.

Consultants and Researchers
191 Eglinton Ave. E., Suite 303, Toronto, Ont., Canada M4P 1K1
Telex: 06-218117 (416) 482-5215

81111-50.0

30 March 1982

CMHC - COST AND DESIGN GUIDELINES
IN HOUSING DISABLED PERSONS

CONSENT FORM

Cluff and Cluff Architects/Associated Planning Consultants are conducting a study, for Canada Mortgage and Housing Corporation (CMHC) entitled "Cost and Design Guidelines in Housing Disabled Persons". A number of case studies across Canada are to be visited with a view to collecting information on disability-related design features in a variety of housing contexts, how these features relate to the function of the disabled person and other occupants, and the cost of incorporating these features into housing units. In some instances, photographs may be taken of particular design features.

The information obtained in this study will provide valuable information on the cost of incorporating disability-related adaptations into a variety of housing contexts, should permit a more systematic utilization and interpretation of existing funding programs, and will help ensure a more equable distribution of appropriate shelter alternatives for disabled persons.

The information collected will be incorporated into a final report of case studies to be submitted to CMHC. Names and addresses of people interviewed will not be included in the final report.

If you agree to provide information to assist us in this study, please sign your name below. Your assistance is very much appreciated.

Name ______________________

Date ______________________

APPENDIX 3 - LIST OF CONTACTS

The following is a list of individuals and agencies who were contacted, either in person, by telephone or letter, for the purpose of obtaining information on potential case studies located in the five regions.

ATLANTIC REGION:

ACCESS HOUSING, Halifax, N.S.
ACTION HOUSING, Charlottetown, P.E.I.
BREAND, MR. D., Bedford, N.S.
CANADA MORTGAGE AND HOUSING CORPORATION
CROSSMAN, MR. D., Halifax, N.S.
DECOFF, Mr. C., Bedford, N.S.
DEPARTMENT OF SOCIAL PLANNING, Halifax, N.S.
ESCASONIE, St. Johns, Nfld.
FALKENHAGEN, MR. J., St. John, N.B.
FORTUNE, MS. S., Halifax, N.S.
KERR, MR. D., Bedford, N.S.
LOW, MR. K., Bedford, N.S.
MARTIGNY, MR. R., Charlottetown, P.E.I.
McCALLUM, MS. W., Dartmouth, N.S.
MCLAREN, MR. R., Halifax, N.S.
NOVA SCOTIA HOUSING COMMISSION, Bedford, N.S.
PITT, MR. A., Halifax, N.S.
RANKIN, MR. H., Halifax, N.S.
REPP, MR. G., Dartmouth, N.S.
RICHARDS, MR. V., Charlottetown, P.E.I.
ROCKWOOD, MR. J., St. John, N.B.
ROSE, MR. A., St. Johns, Nfld.
SMITH, MR. R., St. John, N.B.
ST. PATRICKS MERCY HOME
THE REGIONAL RESIDENTIAL SERVICE SOCIETY
TRAVERSEY, MS. KAREN, Halifax, N.S.
TUCKER, MR. M., Halifax, N.S.
WEATHERBY, MR., St. John, N.B.
WELLARD, MS. F., Halifax, N.S.
WICKS, MS. B., Halifax, N.S.
WILLIAMS, SISTER MARGARET, St. Johns, Nfld.

QUEBEC REGION

BALK, MR. R., Montreal, P.Q.
BELL, MR. L., Montreal, P.Q.
CANADA MORTGAGE AND HOUSING CORPORATION, Montreal, P.Q.
CHESHIRE HOMES, Montreal, P.Q.
CORBEIL MR. J., Montreal, P.Q.
DESCHENES, MR. C., Montreal, P.Q.
DEMERS, MR. J.P., Montreal, P.Q.
DOUCET, MR. R., Montreal, P.Q.
FONTAINE, MR. P., Montreal, P.Q.
GARDINER, MR. J., Montreal, P.Q.
HARVEY, MR. J., Montreal, P.Q.
KAUFMAN, MR. T., Montreal, P.Q.
LACHANCE, MR., Montreal, P.Q.
LE CONSEIL DU DEVELOPPEMENT DU LOGEMENT COMMUNAUTAIRE, Montreal, P.Q.

LUCIE BRUNEAU, Montreal, P.Q.
MILTON PARK PROJECT, Montreal, P.Q.
MONTREAL HOUSING AUTHORITY, Montreal, P.Q.
MUNROE, MR. C., Montreal, P.Q.
PERRAULT, MR. F., Montreal, P.Q.
POIRIER, MR. Y., Montreal, P.Q.
PORTE JAUNE, Montreal, P.Q.
STEPHEN, MS. L., Montreal, P.Q.
ST. AMOUR, MR. F., Montreal, P.Q.
ST. LOUIS DU PARC, Montreal, P.Q.

CENTRAL REGION

ANDRESSAKIS, MR. E., Toronto, Ontario
ARORA, MR. O., Toronto, Ontario
BATIUK, MS. P., Ottawa, Ontario
BELLWOOD PARK HOUSE, Toronto, Ontario
BERENICK, MS. P., Toronto, Ontario
BONSER, MS. D., Toronto, Ontario
CANADA MORTGAGE AND HOUSING CORPORATION, London/Toronto/Ottawa, Ontario
CITY HOMES, Toronto, Ontario
CHESHIRE HOMES, Toronto, Ontario
CLARENDON FOUNDATION, Toronto, Ontario
DAVID ARCHER CO-OP, Toronto, Ontario
DONHUE, MR. M., Burlington, Ontario
EADES, MR. R., Toronto, Ontario
EVANS, MS. P., Toronto, Ontario
FITZPATRICK, MS. S., London, Ontario
GRAB, MS. M., Toronto, Ontario
HODGSON, MR. L., Toronto, Ontario
KIRK, MR. J., Toronto, Ontario
MCLEOD, MS. M., Toronto, Ontario
METRO HOUSING, Toronto, Ontario
MORIN, MS. M., Toronto, Ontario
RAMPARTS CONSTRUCTION, Toronto, Ontario
RODGERS, MS. J., Toronto, Ontario
RUFFO, MR. G., Toronto, Ontario
RUSSEL, MR. F., Toronto, Ontario
SANDERSON, MR. J.W., Toronto, Ontario
SMITH, MS. L, Toronto, Ontario
WRIGHT, MS. D., Toronto, Ontario
YOUNG RANLEIGH INVESTMENTS, Toronto, Ontario

PRAIRIE REGION

ALBERTA REHABILITATION COUNCIL, Edmonton, Alberta
BURKE - GAFFNEY, MS. T., Winnipeg, Manitoba
CAREY, MR. D., Regina, Saskatchewan
CANADA MORTGAGE AND HOUSING CORPORATION, Saskatoon, Saskatchewan

CANADIAN PARAPLEGIC ASSOCIATION, Edmonton, Alberta
CATHOLIC SOCIAL SERVICES, Edmonton, Alberta
CHESHIRE HOMES, Saskatoon, Saskatchewan
EXTENCE, MR. T., Winnipeg, Manitoba
FREUDENBERG, MR. L., Winnipeg, Manitoba
FALLIS, MR. R., Winnipeg, Manitoba
GEATHER, MS. S., Saskatoon, Saskatchewan
HANDICAPPED HOUSING SOCIETY OF ALBERTA, Edmonton, Alberta
HILDERMAN, MR. E., Winnipeg, Manitoba
KIWANIS CENTRE OF THE DEAF, Winnipeg, Manitoba
KLEIN, MR. D., Edmonton, Alberta
LITTLE, MR. L., Saskatoon, Saskatchewan
MANITOBA HOUSING AND RENEWAL CORPORATION, Winnipeg, Manitoba
MATE, MS. M., Winnipeg, Manitoba
METCALFE, MR. R., Edmonton, Alberta
OFFICE OF CONTINUING CARE, Edmonton, Alberta
OLSEN, MR. O., Winnipeg, Manitoba
OWEN, DR. J., Saskatoon, Saskatchewan
PEEVER, MS. S., Winnipeg, Manitoba
POITRAS, MR. R., Edmonton, Alberta
RILEY, MS. K., Winnipeg, Manitoba
SASKATCHEWAN CENTRE FOR CRIPPLED CHILDREN AND ADULTS, Saskatoon, Sask.
SENIO, MR. A., Edmonton, Alberta
SIMMS, REV. A, Winnipeg, Manitoba
SIMPSON, MR. & MRS. A., Winnipeg, Manitoba
SIR DOUGLAS BADER TOWERS, Edmonton, Alberta
SMITH, MR. E., Winnipeg, Manitoba
STINSON, MR. H., Saskatoon, Saskatchewan
THOMPSON, MS. E., Edmonton, Alberta
THOMPSON, MR. M., Winnipeg, Manitoba
TOPLINS, MS. K., Winnipeg, Manitoba
VOICE OF THE HANDICAPPED, Regina, Saskatchewan

WEST COAST REGION

BELKIN, MS. M., Vancouver, B.C.
BETA CONSTRUCTION, Vancouver, B.C.
B.C. HOUSING MANAGEMENT, Vancouver, B.C.
BROWNLEE, MR. T., Vancouver, B.C.
CHRYSTAL, MS. M., Vancouver, B.C.
CANADA MORTGAGE AND HOUSING CORPORATION, Vancouver, B.C.
CANADIAN PARAPLEGIC ASSOCIATION, Vancouver, B.C.
COCHRANE, MS. M., Vancouver, B.C.
DESJARDINS, MR. E., Vancouver, B.C.
ELLIOTT, MR. P., Vancouver, B.C.
FALSE CREEK DEVELOPMENT, Vancouver, B.C.
FULLER, MR. G., Vancouver, B.C.
GALAN, MR. R., Vancouver, B.C.
GREATER VANCOUVER HOUSING CORPORATION, Vancouver, B.C.
HALL, MR. R., Vancouver, B.C.

HANDICAPPED RESOURCE CENTRE, Vancouver, B.C.
KELLY COURT, Vancouver, B.C.
MALONE, MS. L., Vancouver, B.C.
MOWATT, MR. D., Vancouver, B.C.
PHILIPPS, MS. S., Vancouver, B.C.
SCHMIDT, MR. W., Vancouver, B.C.
SOROSKIE, MS. J., Vancouver, B.C.
STEPHENSON, MR. D., Vancouver, B.C.
TAPPING, MR. K., Vancouver, B.C.
WATSON, MR. L., Vancouver, B.C.

APPENDIX 4 - FUNDING PROGRAMS

In accordance with the requirements of the contract for the research study "Cost and Design of Housing for Disabled Persons: Case Studies", this Appendix has been prepared to provide a description of the public and third sector financing available, in the provinces in which the case-studies are located, for the conversion and improvement of existing housing into fully accessible units.

It is difficult to determine with any accuracy the degree to which these funding mechanisms have been used by disabled persons since frequently, as in the case of RRAP funding, the applications are not coded as being for accessibility-related rehabilitation purposes.

There are programs included in this appendix which are not specifically designated for disabled persons, however, they have been documented to provide an indication of the range of programs potentially available. There has been some uptake of these programs by disabled persons, however, it has been difficult to determine to what degree, since they are not generally identified as being for the removal of architectural barriers in the home.

As details of funding programs are changing continuously, no assurance can be given that the information provided below on various programs is up-to-date at the time of reading.

INTRODUCTION

There exists in Canada a significant disabled population requiring special housing, appropriate to their specific needs in a variety of housing contexts. As a consequence of low personal income levels, however, many disabled persons are unable to compete in the market place, for new homes. Such disabled persons need to rely on social housing programs, congregate living settings or the family unit where some financial support is available to offset the high housing and/or housing modification costs.

While there are funding programs sponsored by all levels of government for the purpose of adapting/converting the housing unit, the degree to which these programs have been utilized by disabled persons appears to be largely dependent upon the design and cost features of the required adaption, the location, sponsorship and life-style appropriateness.

PUBLIC SECTOR FINANCING

Federal Assistance

The Residential Rehabilitation Assistance Program (RRAP) is a federal program available through Canada Mortgage and Housing Corporation (CMHC) under Section 34.1 of the National Housing Act (NHA).

Low interest loans are made available to homeowners and landlords who wish to make repairs or alterations to existing substandard housing in designated areas. Recent amendments to the program have been made to meet the needs of disabled persons wishing to take advantage of RRAP funding to make their home more accessible, regardless of the location of their home.

Under the program, loans of up to $10,000 are available to an individual to make the dwelling accessible to the disabled person. A maximum of $3,750 may be forgiven, based on an adjusted family income of $9,000 or less. According to recently proposed changes, these amounts are to be increased to a $13,000 loan, a maximum of $6,500 forgivable and a family income of $13,000.

The person applying for the loan must:

- Own and live in the home
- Be disabled or have a disabled person living in the home
- Have repairs or alterations to make the home more accessible for the disabled person
- Meet CMHC RRAP standards after the work is completed.

The forgivable portion of the loan is based upon:

- The adjusted family income

- The cost of renovations and repairs
- The continued ownership and occupancy of the home

Loan repayments are made in monthly installments, spread over a maximum of 20 years. The recipient has the right to increase monthly payments at any time or make a final lump sum payment without penalty.

Landlords may also take advantage of RRAP funding in order to alter or renovate rental units for disabled persons. Forgivable loans are available of up to 50% of the cost of repairs to a maximum of $2,500 per unit, with the balance coming from private sources, e.g., personal monies, loans etc. According to recently proposed changes, this amount is to be increased to a maximum of $5,000 per unit.

Co-operative housing can take a variety of forms, it can consist of single or multiple family housing, hostels or group homes. It can be provided through the construction of new buildings or the acquisition of existing ones.

RRAP funding is available to approved public and private non-profit co-operatives, where funding for repair or modification of existing buildings is required. There is a specific advantage to applying for RRAP funding at the time of purchase of an existing building. Initially, the calculation of assistance, under 56.1 of the N.H.A., is based solely upon the agreed-to-cost of the project, including the cost or rehabilitation. However, the forgivable portion of RRAP is subtracted from the actual loan that has to be repaid. This lesser loan amount, and therefore smaller mortgage payment, allows more assistance to be available for the occupants in a renovated project than those occupying a building newly constructed.

The Aging Veterans Program

This is a new program administered by Veterans Affairs Canada.

The program provides a grant for up to $2,500 to veterans wishing to adapt their home.

Recipients of the grant must be in receipt of a veterans disability pension and the disabling condition must be directly attributable to the original war injury.

The applicant must enter into a contract agreement with the person hired to modify the home and payment of the grant is issued jointly to the Contractor and recipient upon completion of the work.

PROVINCIAL ASSISTANCE

Nova Scotia

The Access-a-Home program is a home adaption program which operates under the auspices of the Nova Scotia Housing Commission (NSHC). The program

is intended to assist wheelchair disabled persons, or the family of a person confined to a wheelchair, to adapt their own home.

The program is intended to assist in the elimination of architectural barriers in the home, and adaptions made must be of a permanent nature.

Applicants with a gross family income of $15,000 or less, per annum, are eligible for a grant of 90% of the first $1,500 of approved work and materials, to a maximum of $1,350. Applicants with a gross family income in excess of $15,000 per annum, are eligible for a grant of 70% of the first $1,500 of approved work and materials.

The Senior Citizens Assistance Program

This program is a provincially funded program, operated by the NSHC. While not specifically designated for disabled persons, it is assumed that a percentage of the senior population is disabled and would, therefore, benefit from the program.

The program provides a $3,000 forgiveness loan to senior citizens, in order that they might carry out repairs to their home.

The applicant must own the home, and at least one of the owner/occupants must be over 65 years, with a qualifying income of $12,000 per annum. A senior citizen with a life interest in the property may also apply.

The Small Loans Assistance Program

This program offers financial assistance to homeowners, in the form of low-interest loans, in order that they might carry out repairs in and around their property. The program is funded by the province and is available through the NSHC.

The maximum amount available is $10,000 dependent upon the applicants ability to repay, and the cost of the work being done.

Generally, loans through the program can be used to finance the following:

- Home repairs - both interior and exterior
- Additions
- Alterations and renovations
- Create and apartment

- Complete an existing home

The program is intended to serve persons with an adjusted family income of less than $17,000 per annum, and who own and occupy their home. Adjusted family income is calculated by deducting from the gross family income $500 for each dependent child, $1,000 for a family where both parents are employed or $1,000 for a single parent family.

All loans must be secured by a registered first or second mortgage. The total of all mortgages must not exceed 75% of the value of the property. The Nova Scotia Housing Commission will prepare and register the mortgage documents where the loan is in an amount of less than $5,000. If the loan is in excess of this amount, then the mortgage must be prepared and registered by a solicitor. In either case, the legal costs in connection with the loan are the responsibility of the borrower. Borrowers of amounts over $5,000 are also required to carry sufficient fire insurance.

The loan is repayable in monthly installments over a maximum period of five years for a loan of less than $5,000; ten years for a loan of over $5,000.

Manitoba

The Critical Homes Repair Program (CHRP)

This program was originally introduced in 1975, to assist low-income pensioners and families in need of renovations to their homes. In addition a major emphasis was placed on job creation.

The program has recently been re-activated and expanded upon, by the Manitoba Housing and Renewal Corporation (MHRC).

The new CHRP guidelines provides for grants of up to $1,500., on a sliding scale, for pensioners with a maximum gross income of up to $14,000, and up to $3,000 in loans and grants to families with a maximum adjusted gross family income of up to $16,000.

Eligible dwellings must be at least ten years old, however, consideration will be given to assisting home owners in special circumstances.

Applicants who have received a grant and/or loan prior to April 1979 under the CHRP, are eligible to receive further assistance.

The Provincial Welfare Department

This department will fund basic accessibility modifications for persons in receipt of social assistance.

The Manitoba Housing and Renewal Corporation

The corporation will fund modifications to Fokus style projects.*

Ontario

The Ontario Home Renewal Program (OHRP) This program is administered by the Province and local municipalities.

The program is designed to assist the owner/occupant to repair or improve their home. A loan allowance of up to $7,500 is permitted, based on an adjusted family income of $12,500.

The program is frequently utilized in areas which do not qualify for RRAP funding.

Quebec

The Dwelling Restoration Assistance Program is administered by the Ministere du Logement Subventionne. The program is available to assist low-income families to maintain and/or renovate their own homes.

British Columbia

The Provincial Ministry of Housing operates a rental unit conversion program, offering loans of up to 25,000 to create new suites. Interest rates of 14-15% are available if the loan is secured by a first mortgage.

THIRD SECTION FINANCING

This type of financing mechanism refers to any funding source other than public (government) or private (entrepreneurial).

This type of financial assistance, is available from a wide variety of sources, including:

- The Workmen's Compensation Board
- Crippled Childrens Centres
- Disabled Consumers Associations
- Charitable Organizations such as Churches, Service Clubs

* These are projects following the Fokus Society principles of design. i.e.: providing specially designed units, dispersed throughout normal family-type apartment buildings, and reflecting a high degree of concern for appropriate detailing for severely disabled persons, including kitchen and bathrooms that are designed with counters and equipment that are completely flexible in height, to suit any disability. The Fokus Society is a private Swedish organization that sponsors research, builds dwellings, and provides services for severely disabled persons.

- Insurance Claims
- Law Suites

With one documented exception, it appears that the need for financial assistance for the purpose of housing adaption is based on:

- The applicants individual needs, as assessed by the agency and/or medical practitioner.
- The financial ability of the agency/organization contacted to absorb either totally or partially the costs of the required adaption.

In the event that adaptions are approved and financed as a consequence of an insurance claim or law suite, the amount of the claim and the type of modifications are determined individually.

National Organizations

The Workmens Compensation Board (WCB)

The Workmen's Compensation Board provides some financial assistance for home modification to persons injured at work. The applicant must be confined to a wheelchair and the need for the requested adaption must be confirmed by the applicants family physician.

Upon receipt of an application, the Medical Aid Division of WCB will investigate to determine the degree and type of adaptions required. The Medical Aid Division will provide funds to promote general access to the home and circulation within the home. The amount of the loan may vary from a maximum of $5,000 at one level, to a maximum of $25,000, if approved by the Executive Director to a indeterminate amount if approved by the Board of Directors of the WCB.

The Vocational Rehabilitation Division will then investigate to determine whether additional modifications are required which would benefit the disabled person.

This department will provide an additional grant of up to $5,000 to facilitate access to areas not covered by the Medical Aid Division.

Provincial Organizations

Ontario

The Ontario Crippled Childrens Centre may provide partial funding to the family of a disabled child, for the purpose of adapting their home.

District nurses will assess the need for modifications and approach the Easter Seal Service Clubs for funding. The Crippled Childrens Centre will then share the cost of the adaption with the Service Club if required.

The assessments are made based on individual needs and there are no minimum or maximums established.

The Direct Aid Fund is administered by the Ontario Chapter of the Canadian Paraplegic Association, and will provide for minimal adaptions to the home, if and when funds are available.

Manitoba

In Manitoba, the Canadian Paraplegic Association will supply materials to improve the accessibility of a disabled persons home, however, the applicant is responsible for labour costs.

Others

It appears that even where the consumer and service organizations are Canada wide, each provincial chapter embraces different policies and procedures for dealing with their members.

Since there is difficulty, in documenting all sources of third sector financing for disabled persons, the following is a partial listing of organizations who may be able to assist:

- The Canadian National Institute for the Blind
- The Kinsmen Rehabilitation Foundation
- The Stroke Association
- The United Way Agencies
- The Easter Seal Agencies
- The Muscular Dystrophy Association
- The Multiple Sclerosis Association
- Churches of all denominations
- The Shriners
- The Kiwanis Clubs

The above listing is intended only to provide an indication of possible sources of third sector financing.

APPENDIX 5

Cost and Geographical Update Indices

Cost estimates are prepared in mid-1982 dollars in the city of the study.

In order that the estimates provided may be translated to other cities, a Locational Cost Adjuster is provided below for a number of cities.

In order that cost estimates may be updated in time, a Time Cost Adjustment formula is provided below.

Locational Cost Adjuster

As the cost estimates of each case study are based in the city of the study, a multiplier is necessary to determine the relative cost of disability features in another city.

The table on the next page provides multipliers which may be used as follows.

From Case Study No. 1, it is determined that the total cost of the features is $3,120 (mid-1982 dollars) in Toronto.

To determine the relative cost in Vancouver, a multiplier of 1.111 is used.

Therefore: $3,120 x 1.111 = $3,466.32

The relative estimated cost of all features in Vancouver is $3,466 (mid-1982 dollars).

In applying a simple average multiplier, consideration is not given to the special cases which will vary from one part of the country to another. For instance, the extent of insulation, or the cladding materials used are quite different in Halifax than in Montreal, Winnipeg or Vancouver.

The Locational Cost Adjuster Table is based on April 1982 dollars and should be updated quarterly using "Construction Cost Trends" indices.

The "Construction Cost Trends" Table D shows indexes for various Canadian Cities based on Toronto July 1973 = 100.0.

In order to determine the adjuster, the index for the city to be adjusted to, is divided by the index for the originating city.

For instance from Halifax to Montreal and from Montreal to Halifax

$$\frac{220.4}{230.2} = 0.957 \qquad \frac{230.2}{220.4} = 1.044$$

LOCATIONAL COST ADJUSTER BASED ON APRIL 1982 DOLLARS

REGION		ATLANTIC			QUEBEC	ONTARIO	PRAIRIE			WEST COAST
REGION	TO FROM	ST. JOHN'S	HALIFAX*	ST. JOHN	MONTREAL	TORONTO	WINNIPEG	REGINA	EDMONTON	VANCOUVER
ATLANTIC	ST. JOHN'S		0.847	0.892	0.811	0.858	0.859	0.996	0.958	0.953
	HALIFAX*	1.180		1.053	0.957	1.012	1.014	1.175	1.131	1.124
	ST. JOHN	1.121	0.950		0.910	0.962	0.964	1.117	1.074	1.068
QUE	MONTREAL	1.233	1.044	1.099		1.057	1.059	1.228	1.181	1.174
ONT	TORONTO	1.166	0.988	1.040	0.946		1.002	1.161	1.117	1.111
PRAIRIE	WINNIPEG	1.164	0.986	1.038	0.999	0.998		1.159	1.115	1.108
	REGINA	1.004	0.851	0.895	0.814	0.861	0.863		0.962	0.956
	EDMONTON	1.044	0.884	0.931	0.847	0.895	0.897	1.040		0.994
W.C.	VANCOUVER	1.050	0.889	0.936	0.852	0.900	0.902	1.046	1.006	

* Including Dartmouth

Source - Construction Cost Trends (Output Index) by Construction Data Systems Ltd., Montreal, Quebec

Time Cost Adjustment Formula

The estimates for the Case Studies are prepared as if work is awarded and carried out starting in mid-1982 .

In order that the estimates provided may be meaningful at a later time, it is necessary to calculate time cost adjusters.

This can be done by:

(a) Determining from "Construction Cost Trends" the latest published index for the city of the Case Study.

(b) Dividing this index by the index for the same city in July 1982. The resulting time cost adjuster can be applied to the estimate to determine the latest cost.

Cost Trends

"Construction Cost Trends", produced by Construction Data Systems Ltd., Montreal, Quebec, is a quarterly publication illustrating construction cost indices due to time and location, for various Canadian cities.

The relative differences in cost are measured in units per cent and are based on surveys of in-place prices for twenty basic construction operations. These operations relate to building work and cover the major ingredients of most building projects.

Information is generated by canvassing contractors, sub contractors, construction associations and cost consultants. The data accumulated is produced in 4 tables A to D.

The Locational Cost Adjuster and Time Cost Adjustment Formula described in this report uses Table D as the basis for conversion.

Information from Table D is reproduced below to indicate Cost Trends.

CITY	APRIL 1976	APRIL 1977	APRIL 1978	APRIL 1979	APRIL 1980	APRIL 1981	APRIL 1982
ST. JOHN'S	153.3	166.6	169.8	191.7	213.6	244.4	271.7
HALIFAX	136.7	144.3	146.8	166.1	188.0	206.4	230.2
SAINT JOHN	141.1	150.3	152.7	172.1	192.0	218.0	242.3
MONTREAL	142.3	146.3	149.7	162.9	177.8	197.6	220.4
TORONTO	139.2	142.1	141.5	163.1	186.9	207.0	233.0
WINNIPEG	143.8	151.4	157.0	169.7	198.3	212.4	233.5
REGINA	150.3	157.6	161.8	190.6	221.0	232.5	270.6
EDMONTON	142.6	152.1	162.7	195.7	231.1	235.5	260.3
VANCOUVER	151.0	157.9	165.1	181.1	201.2	224.4	258.8
NATIONAL COMPOSITE	142.9	148.4	153.1	174.0	199.9	217.8	245.2